1954

CENSUS OF MANUFACTURES

VOLUME IV

INDEXES OF PRODUCTION

SCAN ENTIRE BOOK

U. S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS

BOARD OF GOVERNORS OF THE
FEDERAL RESERVE SYSTEM

U. S. DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS

UNITED STATES

Census of Manufactures 1954

Volume IV

INDEXES OF PRODUCTION

Manufacturing production indexes for 1954 relative to 1947, based largely on Census of Manufactures data

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1954 CENSUS OF MANUFACTURES FINAL REPORTS

Volume I: SUMMARY STATISTICS

Chapter

I. General Summary
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III. Size of Establishments
IV. Type of Organization
V. Manufacturers' Inventories
VI. Expenditures for Plant and Equipment

Chapter

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IX. Industrial Water Use
X. Selected Materials Consumed
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XII. Selected Metalworking Operations

SPECIAL REPORT: Manufacturing Activity in Government Establishments. The special report also appears in Volumes II and III.

Chapters I–XII also issued as separate reports in Bulletin Series MC–200.

Volume II: INDUSTRY STATISTICS

Separate chapters for each of 81 groups of related industries. These chapters include, for approximately 460 individual industries, statistics on employment and payrolls, inventories, capital expenditures, fuels, electric energy, and power equipment as well as quantities and values of individual products made and materials used. Also included in this volume is a general summary chapter and separate summary chapters for each of the 20 major industry groups. (The 81 industry group chapters were issued as separate reports in Bulletin Series MC–20A–MC–39E.)

Volume III: AREA STATISTICS

Separate chapters for each State, the District of Columbia, and Alaska and Hawaii. Statistics for standard metropolitan areas, counties and cities, and States by industry with cross classification by industry group for large standard metropolitan areas and principal counties. Also included in this volume is a summary chapter for each of the nine geographic divisions. (The State chapters were issued as separate reports in Bulletin Series MC–100.)

Volume IV: INDEXES OF PRODUCTION

This volume shows manufacturing production indexes for 1954 relative to 1947 based largely on Census of Manufactures data. Indexes are shown for total United States manufacturing output, major industry groups, industry groups, and 436 individual industries. In addition, there is a comprehensive discussion of concepts, procedures, and problems.

1954 CENSUS OF MINERAL INDUSTRIES FINAL REPORTS

Volume I: Summary and Industry Statistics

Volume II: Area Statistics

1954 CENSUS OF BUSINESS FINAL REPORTS

Volume I: Retail Trade—Summary Statistics
Volume II: Retail Trade—Area Statistics
Volume III: Wholesale Trade—Summary Statistics, and Public Warehouses
Volume IV: Wholesale Trade—Area Statistics
Volume V: Selected Service Trades—Summary Statistics
Volume VI: Selected Service Trades—Area Statistics

Central Business District Bulletins

ACKNOWLEDGMENTS

This is the final volume in the series presenting the results of the 1954 Census of Manufactures, supplementing the three basic data volumes--Summary Statistics, Industry Statistics, and Area Statistics. This volume presents measures of change in manufacturing output from 1947 to 1954 with historical comparisons back to 1899.

The preparation of production indexes for manufactures was undertaken by the Bureau of the Census and the Board of Governors of the Federal Reserve System in the development of measures of change from 1939 to 1947 *(Census of Manufactures, 1947, Indexes of Production)*. In the current volume carrying these indexes forward from 1947 to 1954, these agencies have been joined by the Bureau of Labor Statistics.

Mr. Maxwell R. Conklin, Chief of the Industry Division at the Bureau of the Census, was in general charge of the production index work, as well as the Manufactures Censuses which provided the great bulk of source data for the index. Mr. Morris R. Goldman and Mr. Irvin Strauss of the Industry Division carried the principal Census responsibility for developing the group and individual industry indexes and for various special analyses made in connection with the project.

Mr. Milton Moss of the Board of Governors' staff developed the broadened form of analysis used in compiling and reviewing the 1947 to 1954 results. Messrs. Frank R. Garfield and Clayton Gehman advised at various junctures on basic procedures and on the analytic content of the final report. Mr. Frank de Leeuw supervised the compilation of the combined indexes and assisted in the review of the results. Mr. Moss prepared the text of this volume which was reviewed by the above-mentioned individuals and by representatives of the Bureau of Labor Statistics.

Mr. Jack Alterman carried general responsibility for the Bureau of Labor Statistics' participation in the joint project. Mr. Jerome A. Mark, assisted by Miss Elizabeth Kahn, was chiefly responsible for the development, within the framework of the project, of price index comparisons for purposes of review and calculation of certain production indexes. Mr. Julian Frechtman was chiefly responsible for the Bureau's participation in the development of the industry indexes and review of the preliminary and final results. He was assisted by Mr. George Hermanson and Miss Mary Kelly.

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CHAPTER 1. INTRODUCTION

This volume presents indexes of production of manufacturing industries in the United States for the year 1954 relative to 1947. Indexes are shown for individual industries and industry groups as well as for all manufacturing, and are based almost entirely on data collected in the Census of Manufactures for 1947 and 1954. Census of Manufactures data are generally far more comprehensive than those available monthly or annually from other sources, and hence permit more accurate estimates of output change over the period than can be developed from other data. The indexes in this volume provide benchmarks for current measures of production in the manufacturing sector, which in turn are used in various ways for analyzing domestic economic developments and comparing them with developments abroad.

The 1947-54 indexes represent a continuation of the measures for 1947 relative to 1939 calculated by the Census Bureau and the Federal Reserve Board and previously back to 1899, constructed by the National Bureau of Economic Research.[1] The present calculations were made jointly by the Census Bureau, the Bureau of Labor Statistics, and the Federal Reserve Board. Available indexes for industry groups and indexes for total manufacturing for Census years since 1899 are shown in table 1 on a 1947 comparison base. The newly calculated 1954 indexes and weights for individual industries, groups, and for the total are shown in table 2. Both of these basic reference tables are in chapter 2.

Summary of Findings and Scope

Three sets of weights were used to calculate the 1947-54 change in manufacturing production. With 1947 weights total manufacturing production in 1954 is calculated at 131 percent of the 1947 level, as shown in table 2. With 1954 weights the total index is 126 and with weights based on average unit values for 1947 and 1954 it is 128.

Over the period from 1947 to 1954 all major groups of industries except leather and products showed increases in output, but the changes were highly diverse, as shown in chart 1. Some industries showed increases approximately in line with the 13 percent increase in population, such as a number of the apparel and food industries. Other industries experienced tremendous growth, particularly those making aircraft, television sets, and chemicals. Industries such as primary metals and textiles were particularly affected by the general economic recession in 1954. Thus the comparison between the two years reflects both (a) the marked general upward trend in output over the period and (b) the cyclical aspect in which the year 1947 was in a high phase of business activity and 1954 in a low phase. These diverse economic influences are discussed in chapter 4 of this report in connection with the analysis of differences in indexes resulting from use of different weight periods.

Indexes were developed for many more products and industries than in past measures of manufacturing output, largely because of the more detailed physical quantity data available in the censuses for 1947 and 1954. Indexes for 436 individual industries are shown in chapter 2, table 2, representing a complete listing (with certain combinations) of every individual manufacturing industry. Indexes were calculated directly for 327 industries accounting for 86 percent of total value added by manufacture in 1954. For each of the other 109 industries, indexes were estimated by deflation of census data on dollar value of output on the assumption that price (unit value) changes in these industries were the same as in related industries for which indexes were calculated directly. A feature of the present calculations was the intensive use of wholesale price indexes both for review of unit value changes indicated by census data and for deflation of value data where quantity information was lacking or inadequate.

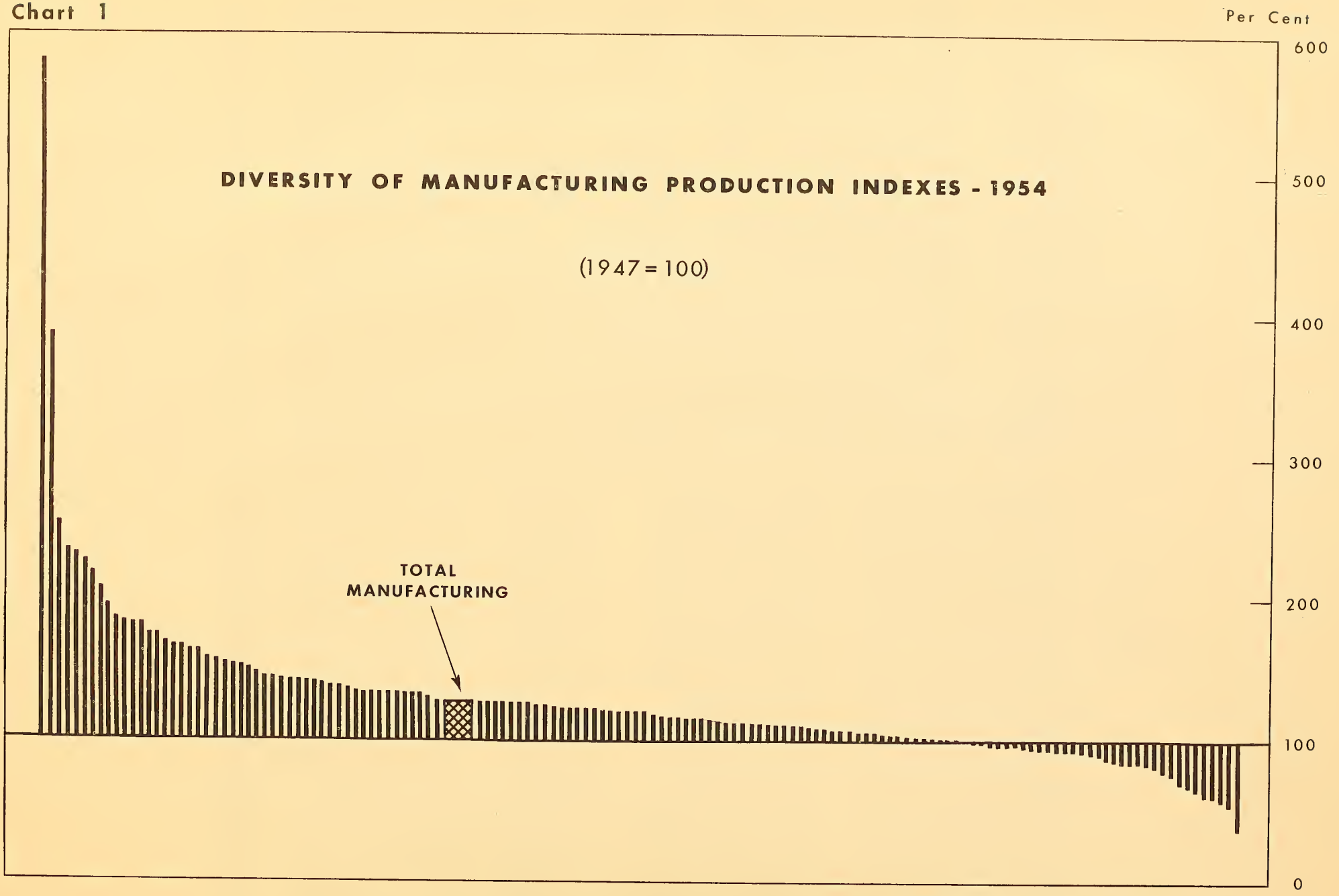
The 1954 Census of Manufactures covers all establishments primarily engaged in manufacturing as defined in the 1945 *Standard Industrial Classification Manual* as amended by the Bureau of the Budget. A major amendment is the inclusion in manufacturing of fluid milk processing establishments. Certain other amendments are noted in chapter 3 of this report.

The indexes in this volume represent estimates of changes in manufacturing industries in value added in constant prices. Such measures are referred to variously as changes in "physical volume," or "real output." The general approach followed in this study consisted in the intensive use of physical quantity data on output of individual products combined in such a way as to yield an appropriate measure of the change for manufacturing industries in value added in constant prices.[2] Thus, value added in manufacturing increased from a total of $77 billion in 1947 to $116 in 1954, or 51 percent. This represents an increase both in "real" output and in prices. As noted earlier, the increase in "real output" (constant price) was calculated at 31 and 26 percent, based respectively on 1947 and 1954 weights as indicated in table 2. The implied change in value added per unit in manufactures, on this basis, is therefore between 15 and 20 percent. A detailed discussion of procedures is given in the following chapter.

[1] For the 1899 to 1939 indexes see The Output of Manufacturing Industries, 1899-1937 (New York, 1940) and Employment in Manufacturing, 1899-1939 (New York, 1942). For the 1939-47 indexes, see Census of Manufactures: 1947 Indexes of Production (Washington, D. C., 1952).

[2] For a discussion of the relation between this approach and that used in constructing "net output" indexes, see chapter 5.

Chart 1



NOTE – Indexes shown are for the 142 three-digit industries of the U. S. Standard Industrial Classification. The range in variation would be considerably larger than indicated if four-digit industry indexes or if product indexes were shown. Also, for one major group – Ordnance – the estimated index, not shown in the chart, is 1,704, as shown in Table 2.

CHAPTER 2. INDUSTRY GROUP AND INDUSTRY INDEXES

Table 1.--PRODUCTION INDEXES FOR ALL MANUFACTURING AND FOR INDUSTRY GROUPS, CENSUS YEARS 1899-1954

(1947 = 100)

Code	Major group	1954	1947	1939	1937	1935	1933	1931	1929
	All manufacturing industries.....	128	100	57	58	46	35	40	56
20	Food and kindred products.....	109	100	65	61	52	37	41	46
21	Tobacco manufactures.....	108	100	66	65	56	48	51	55
22	Textile mill products.....	109	100	80	72	67	57	58	67
23	Apparel and related products.....								
24	Lumber and wood products.....	116	100	72	69	54	42	57	91
25	Furniture and fixtures.....								
26	Pulp, paper and products.....	131	100	68	63	53	44	45	52
27	Printing and publishing.....	126	100	69	73	62	52	60	72
28	Chemicals and products.....	164	100	46	43	35	29	30	35
29	Petroleum and coal products.....	131	100	65	61	49	42	45	54
30	Rubber products.....	114	100	55	51	45	39	39	57
31	Leather and leather goods.....	90	100	87	86	79	68	142	79
32	Stone, clay, and glass products.....	124	100	87	88	61	42	60	89
33	Primary metal industries.....	103	100	52	58	39	27	32	65
34	Fabricated metal products.....	114	100	50	51	(NA)	(NA)	(NA)	(NA)
35	Machinery, except electrical.....	116	100	38	(NA)	(NA)	(NA)	(NA)	(NA)
36	Electrical machinery.....	165	100	35	(NA)	(NA)	(NA)	(NA)	(NA)
37	Transportation equipment.....	189	100	49	60	48	22	30	66
38	Instruments and related products.....	178	100	52	(NA)	(NA)	(NA)	(NA)	(NA)
39	Miscellaneous manufactures[1].....								

Code	Major group	1927	1925	1923	1921	1919	1914	1909	1904	1899
	All manufacturing industries.....	49	46	43	30	34	29	24	19	15
20	Food and kindred products.....	42	40	38	31	32	34	28	24	19
21	Tobacco manufactures.....	50	45	41	36	38	29	24	21	16
22	Textile mill products.....	63	58	56	43	45	48	41	32	26
23	Apparel and related products.....									
24	Lumber and wood products.....	90	93	82	76	71	75	75	69	74
25	Furniture and fixtures.....									
26	Pulp, paper and products.....	46	40	36	26	27	24	19	14	10
27	Printing and publishing.....	65	59	52	37	39	34	25	19	12
28	Chemicals and products.....	29	24	22	15	18	15	11	8	6
29	Petroleum and coal products.....	45	40	34	30	21	12	9	6	5
30	Rubber products.....	52	48	41	24	30	(NA)	(NA)	(NA)	(NA)
31	Leather and leather goods.....	76	67	75	60	142	64	65	58	50
32	Stone, clay, and glass products.....	88	81	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
33	Primary metal industries.....	52	53	52	26	40	29	28	18	14
34	Fabricated metal products.....	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
35	Machinery, except electrical.....	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
36	Electrical machinery.....	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
37	Transportation equipment.....	45	50	50	25	40	13	7	5	5
38	Instruments and related products.....	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
39	Miscellaneous manufactures[1].....									

Note: The 1954 indexes are industry-type indexes here calculated employing cross weights and including estimates for "indirectly represented" industries. See Chapter 3. The indexes for 1899-1939 are those calculated from Census of Manufactures data by Solomon Fabricant of the National Bureau of Economic Research, and converted to a 1947 base. The indexes for 1954 and those for earlier years differ in the methods used for indirectly represented industries. In constructing the 1954 major group indexes, similarity of gross value per unit of output generally was assumed for the directly and indirectly represented industries of each group, whereas for 1899-1939, similarity of value added by manufacture per unit of output was assumed. (In the joint Census-Federal Reserve Board publication of production indexes for 1947 relative to 1939, similarity of output per employee was assumed for the directly and indirectly represented industries.)

Because of changes in census industry-group classifications, the following combinations and recomputations were required: The 1954 indexes for the "Textiles and apparel" and for the "Lumber and furniture" groups, respectively, were combined to correspond approximately with the industry group classifications used in the National Bureau indexes for 1899-1937. The National Bureau "Foods" and "Beverages" indexes were combined to yield 1899-1937 indexes for the "Food" group as defined for 1947 and 1954. The 1899-1937 series for "Primary metals" was constructed by National Bureau methods from National Bureau series for 5 to 13 industries classified in this group for 1947 and 1954; in each year they represented over 75 percent of the value added for the group. Similarly, the 1937 index for "Fabricated metal products" was constructed from 14 National Bureau series representing 46 and 47 percent, respectively, of the value added for the group in 1937 and 1939.

NA Not available.

[1]Includes Major Group 19, "Ordnance and Accesaories."

Table 2.—PRODUCTION INDEXES AND WEIGHTS FOR MANUFACTURING INDUSTRIES: 1954

(1947 = 100)

Code	Industry group and industry	Proportions in 1947 based on unit values in[1]—			Production indexes: 1954 (1947 = 100)					
					Industry[2] indexes based on—			Product[2] indexes based on—		
		1954 and 1947	1954	1947	Cross weights	1954 weights	1947 weights	Cross weights	1954 weights	1947 weights
	All manufacturing industries	100.00	100.00	100.00	128	126	131			
20	Food and kindred products	13.59	13.54	13.64	109	108	109			
21	Tobacco manufactures	.92	1.00	.83	108	107	109			
22	Textile mill products	5.84	4.97	6.88	105	103	107			
23	Apparel and related products	5.44	4.97	6.00	112	112	113			
24	Lumber and wood products	3.42	3.08	3.83	112	111	113			
25	Furniture and fixtures	1.76	1.73	1.80	124	122	125			
26	Pulp, paper and products	3.82	3.81	3.83	131	131	132			
27	Printing and publishing	5.47	5.38	5.58	126	126	127			
28	Chemicals and products	6.76	6.45	7.12	164	160	169			
29	Petroleum and coal products	2.31	2.18	2.48	131	130	132			
30	Rubber products	1.78	1.86	1.68	114	111	117	(3)	(3)	(3)
31	Leather and leather goods	2.02	2.01	2.04	90	89	90			
32	Stone, clay and glass products	3.23	3.37	3.06	124	123	125			
33	Primary metal industries	8.75	9.85	7.42	103	103	104			
34	Fabricated metal products	6.90	7.23	6.51	114	113	116			
35	Machinery, except electrical	10.98	11.51	10.34	116	114	119			
36	Electrical machinery	5.02	5.00	5.04	165	156	175			
37	Transportation equipment	7.87	8.04	7.68	189	182	197			
38	Instruments and related products	1.51	1.54	1.48	152	149	156			
39	Miscellaneous manufactures	2.50	2.38	2.65	129	123	135			
19	Ordnance and accessories	.11	.10	.11	1,704	1,704	1,704			
20	Food and kindred products	13.59	13.54	13.64	109	108	109			
201	Meat products	1.78	1.81	1.74	120	118	123			
2011	Meat packing plants	1.70	1.74	1.65	110	110	111	117	117	118
2013	Prepared meats									
2015	Poultry dressing plants	.08	.07	.09	*340*	*326*	*352*	*359*	*345*	*371*
202	Dairy products	2.28	2.33	2.23	105	104	105	(3)	(3)	(3)
2021	Creamery butter*	.16	.14	.18	106	106	106	106	106	106
2022	Natural cheese**	.08	.08	.09	120	120	119	128	129	128
2023	Concentrated milk**	.21	.22	.20	85	85	84	96	97	96
2024	Ice cream and ices**	.40	.43	.36	82	82	82	96	96	96
2025	Special dairy products	.06	.06	.06	100	100	100	112	112	112
2026	Fluid milk and other products	1.37	1.40	1.34	*114*	*114*	*114*	(4)	(4)	(4)
2027										
203	Canned and frozen foods	1.07	.98	1.18	146	144	149	(3)	(3)	(3)
2031	Canned seafood	.10	.07	.12	107	108	106	112	113	110
2032	Cured fish	.01	.01	.01	103	103	104	102	101	102
2033	Canned fruits and vegetables	.75	.72	.79	124	124	125	123	122	123
2034	Dehydrated fruits and vegetables	.02	.02	.02	*325*	*325*	*325*	...	...	...
2035	Pickles and sauces	.12	.10	.16	154	155	153	137	138	136
2036	Packaged seafood	.07	.06	.08	*387*	*367*	*408*	*346*	*328*	*364*
2037	Frozen fruits and vegetables									
204	Grain-mill products	1.33	1.33	1.35	105	105	106	(3)	(3)	(3)
2041	Flour and meal	.62	.62	.61	85	85	85	86	86	86
2045	Flour mixes									
2042	Prepared animal feeds	.49	.48	.51	131	131	131	132	132	132
2043	Cereal breakfast foods	.18	.19	.17	98	98	98	119	119	119
2044	Rice milling	.04	.04	.06	132	132	132	129	129	129
205	Bakery products	1.90	2.00	1.77	106	107	106	(3)	(3)	(3)
2051	Bread and related products	1.55	1.65	1.42	102	103	102	102	103	102
2052	Biscuit and crackers	.35	.35	.35	126	125	126	126	126	127
206	Sugar	.29	.27	.30	106	105	106	(3)	(3)	(3)
2061	Raw cane sugar	.02	.01	.02	118	117	119	120	119	121
2062	Cane sugar refining	.14	.14	.13	104	104	104	101	102	101
2063	Beet sugar	.13	.12	.15	106	106	106	105	105	105
207	Candy and related products	.70	.66	.76	98	98	98	(3)	(3)	(3)
2071	Confectionery products	.50	.47	.53	98	98	98	99	99	99
2072	Chocolate and cocoa products	.11	.10	.13	90	90	89	94	94	93
2073	Chewing gum	.09	.09	.10	112	112	112	107	107	107
208	Beverages	2.39	2.30	2.49	103	104	102	(3)	(3)	(3)
2081	Bottled soft drinks	.55	.55	.55	124	124	124	119	119	119
2082	Beer and ale	1.08	1.11	1.04	106	107	105	106	106	105
2083	Malt	.07	.06	.07	87	87	87	83	83	83
2084	Wines and brandy	.12	.12	.12	91	91	91	91	91	91
2085	Distilled liquor	.57	.46	.71	83	81	85	89	87	91
209	Miscellaneous foods	1.58	1.60	1.55	112	110	114	(3)	(3)	(3)
2091	Leavening compounds	.06	.06	.06	83	83	83	93	94	93
2092	Shortening and cooking oils	.16	.12	.21	157	156	157	180	178	180
2093	Margarine**	.04	.03	.06	140	140	140	184	184	184
2094	Corn wet milling	.18	.19	.17	99	99	99	103	103	103
2095	Flavorings	.18	.16	.20	151	151	151	151	151	151

See footnotes at end of table.

Table 2.--PRODUCTION INDEXES AND WEIGHTS FOR MANUFACTURING INDUSTRIES: 1954--Continued

(1947 = 100)

Code	Industry group and industry	Proportions in 1947 based on unit values in[1]--			Production indexes: 1954 (1947 = 100)					
					Industry[2] indexes based on--			Product[2] indexes based on--		
		1954 and 1947	1954	1947	Cross weights	1954 weights	1947 weights	Cross weights	1954 weights	1947 weights
20	Food and kindred products--Continued									
209	Miscellaneous foods--Continued									
2097	Manufactured ice	.28	.27	.29	47	47	47	45	45	45
2098	Macaroni and spaghetti	.05	.05	.05	108	108	108	110	110	110
2099	Food preparations, n.e.c	.63	.72	.51	122	120	125	119	117	122
	Estimated undercoverage	.27	.26	.27	...	...	...	...	...	...
21	Tobacco manufactures	.92	1.00	.83	108	107	109	([3])	([3])	([3])
2111	Cigarettes	.58	.67	.48	111	110	113	114	113	116
2121	Cigars	.17	.17	.18	109	109	109	110	110	110
2131	Chewing and smoking tobacco	.09	.09	.08	92	92	92	87	87	87
2141	Tobacco stemming and redrying	.08	.07	.09	98	97	99	100	99	101
22	Textile mill products	5.84	4.97	6.88	105	103	107	([3])	([3])	([3])
221	Woolen and worsted manufactures	.88	.77	1.02	61	62	61	([3])	([3])	([3])
2211	Scouring and combing plants**	.04	.04	.05	95	95	95	59	59	60
2212	Yarn mills, wool, except carpets	.15	.13	.16	63	63	63	62	62	62
2213	Woolen and worsted fabrics	.67	.57	.78	57	58	57	59	59	59
2216	Finishing wool textiles	.02	.03	.03	95	95	95	...	...	...
222	Yarn and thread mills	.57	.44	.73	103	103	103	([3])	([3])	([3])
2222	Yarn throwing mills	.05	.04	.06	148	148	148	128	128	128
2223	Thread mills	.07	.06	.09	126	125	126	130	130	131
2224	Yarn mills, cotton system	.45	.34	.58	94	94	94	107	107	108
223	Broad-woven fabrics	1.90	1.43	2.46	120	116	122	([3])	([3])	([3])
2233	Cotton broad-woven fabrics	1.46	1.11	1.88	112	109	114	105	102	107
2234	Synthetic broad-woven fabrics	.44	.32	.58	146	141	149	141	136	144
2241	Narrow fabric mills	.11	.08	.14	169	169	169	177	177	177
225	Knitting mills	.97	.86	1.10	118	118	118	([3])	([3])	([3])
2251	Full-fashioned hosiery mills	.32	.24	.41	120	120	120	117	117	117
2252	Seamless hosiery mills	.19	.18	.21	121	120	122	120	119	121
2253	Knit outerwear mills**	.18	.18	.19	138	138	138	135	135	135
2254	Knit underwear mills**	.16	.15	.17	81	81	80	85	85	84
2255	Knit glove mills**	.02	.01	.02	45	45	45	73	73	74
2256	Knit fabric mills	.09	.09	.09	138	138	137	131	132	130
2259	Knitting mills, n.e.c	.01	.01	.01	155	152	159	...	...	...
2261	Finishing textiles, except wool**	.46	.46	.47	110	110	110	110	110	110
227	Carpets and rugs	.41	.40	.42	101	96	107	([3])	([3])	([3])
2271	Wool carpets and rugs	.26	.25	.27	81	79	84	75	73	78
2273	Carpets and rugs, except wool	.03	.02	.04	324	333	316	388	408	372
2274	Hard-surface floor coverings	.12	.13	.11	88	88	87	87	88	86
228	Hats, except cloth and millinery	.12	.12	.12	59	56	62	([3])	([3])	([3])
2281	Fur-felt hats and hat bodies	.09	.09	.08	50	47	53	50	47	53
2282	Wool-felt hats and hat bodies	.01	.01	.02	72	72	72	76	76	76
2283	Straw hats	.01	.01	.01	128	125	131	...	...	...
2284	Hatter's fur	.01	.01	.01	45	45	45	42	42	42
229	Miscellaneous textile goods	.38	.38	.38	110	109	112	([3])	([3])	([3])
2291	Felt goods, n.e.c	.04	.04	.03	124	118	131	120	115	128
2292	Lace goods	.05	.04	.06	91	88	93	...	...	...
2293	Padding and upholstery filling	.06	.06	.06	111	111	110	109	110	109
2294	Processed textile waste	.03	.03	.03	110	108	114	103	101	106
2295	Coated fabric, except rubberized	.07	.08	.07	109	112	106	118	121	114
2298	Cordage and twine	.09	.10	.09	92	88	96	79	76	83
2299	Textile goods, n.e.c	.04	.03	.04	173	171	174	171	170	172
	Estimated undercoverage	.04	.03	.04	...	...	...	...	...	...
23	Apparel and related products	5.44	4.97	6.00	112	112	113	([3])	([3])	([3])
231	Men's and boys' suits and coats	.82	.78	.87	76	76	75	([3])	([3])	([3])
2311	Men's and boys' suits and coats	.80	.76	.85	76	76	75	75	76	75
2312	Suit and coat findings	.02	.02	.02	73	73	74	...	...	...
232	Men's and boys' furnishings	.95	.87	1.04	126	124	129	([3])	([3])	([3])
2321	Men's dress shirts and nightwear	.34	.31	.38	134	129	138	134	129	138
2322	Men's and boys' underwear	.02	.02	.03	157	148	167	112	106	119
2323	Men's and boys' neckwear	.06	.06	.06	87	87	87	87	87	87
2325	Men's and boys' cloth hats	.03	.02	.03	155	153	158	160	158	162
2326	Hat and cap materials	.01	([5])	.01	148	147	149	...	...	...
2327	Separate trousers**	.19	.18	.20	114	110	119	110	106	114
2328	Work shirts	.30	.28	.33	128	131	126	130	132	128
2329	Men's and boys' clothing, n.e.c									

See footnotes at end of table.

Table 2.--PRODUCTION INDEXES AND WEIGHTS FOR MANUFACTURING INDUSTRIES: 1954--Continued

(1947 = 100)

Code	Industry group and industry	Proportions in 1947 based on unit values in[1]--			Production indexes: 1954 (1947 = 100)					
					Industry[2] indexes based on--			Product[2] indexes based on--		
		1954 and 1947	1954	1947	Cross weights	1954 weights	1947 weights	Cross weights	1954 weights	1947 weights
23	Apparel and related products--Continued									
233	Women's and misses' outerwear	1.65	1.48	1.85	123	123	122	(3)	(3)	(3)
2331	Blouses	.14	.13	.16	152	137	166	153	137	167
2333	Dresses, unit-price	.70	.62	.79	111	116	107	105	109	101
2334	Dresses, dozen-price	.19	.18	.20	120	123	117	125	128	121
2337	Women's suits, coats, and skirts	.54	.48	.62	120	119	121	119	118	120
2338	Women's neckwear and scarfs	.02	.02	.02	*53*	*52*	*53*	...	...	...
2339	Women's outerwear, n.e.c.**	.06	.05	.06	244	243	245	150	150	151
234	Women's undergarments	.45	.41	.50	132	134	130	(3)	(3)	(3)
2341	Women's and children's underwear	.25	.21	.30	146	151	141	135	140	131
2342	Corsets and allied garments	.20	.20	.20	115	115	114	116	116	116
2351	Millinery	.12	.11	.13	*99*	*99*	*100*	...	...	...
236	Children's outerwear	.21	.20	.23	181	178	184	(3)	(3)	(3)
2361	Children's dresses	.09	.09	.10	159	159	159	150	150	150
2363	Children's coats	.06	.06	.07	132	131	133	140	139	141
2369	Children's outerwear, n.e.c.**	.06	.05	.06	271	269	274	246	244	249
2371	Fur goods	.14	.12	.16	*65*	*65*	*66*	...	...	...
238	Miscellaneous apparel	.26	.24	.28	125	122	128	(3)	(3)	(3)
2381	Fabric dress gloves**	.02	.02	.02	114	115	114	78	78	78
2382	Fabric work gloves	.04	.03	.05	95	95	95	90	90	90
2383	Suspenders and garters**	.01	.01	.01	60	60	60	57	57	57
2384	Robes and dressing gowns	.05	.04	.05	119	117	120	115	114	117
2385	Waterproof outer garments	.04	.04	.04	*152*	*151*	*153*	...	...	...
2386	Leather and sheep-lined clothing	.02	.02	.02	142	134	151	151	143	160
2387	Belts	.05	.05	.05	142	130	156	146	133	160
2388	Handkerchiefs	.02	.02	.03	83	82	83	79	79	79
2389	Apparel, n.e.c	.01	.01	.01	*208*	*207*	*210*	...	...	...
239	Fabricated textiles, n.e.c	.61	.56	.69	*125*	*122*	*127*	(3)	(3)	(3)
2391	Curtains and draperies	.04	.03	.05	205	208	203	198	201	195
2392	Housefurnishings, n.e.c.**	.19	.18	.20	*106*	*106*	*105*	*129*	*129*	*129*
2393	Textile bags	.08	.07	.09	*79*	*79*	*79*	...	...	...
2394	Canvas products	.05	.05	.05	*146*	*145*	*147*	...	...	...
2395	Tucking, pleating, and stitching	.02	.02	.03	*141*	*140*	*141*	...	...	...
2396	Trimmings and art goods	.06	.05	.08	*195*	*194*	*196*	...	...	...
2397	Schiffli-machine embroideries	.03	.03	.04	*122*	*121*	*122*	...	...	...
2398	Embroideries, except Schiffli	.04	.04	.05	*130*	*129*	*131*	...	...	...
2399	Textile products, n.e.c	.10	.09	.10	105	100	110	112	107	117
	Estimated undercoverage	.23	.20	.25	...	...	...	...	...	...
24	Lumber and wood products	3.42	3.08	3.83	112	111	113	(3)	(3)	(3)
2411	Logging camps and contractors	.38	.37	.38	*112*	*112*	*112*	...	...	...
242	Lumber and basic products	1.75	1.49	2.06	115	114	116	(3)	(3)	(3)
2421	Sawmills and planing mills	1.65	1.41	1.95	114	114	115	116	116	117
2422	Veneer mills	.04	.03	.05	204	204	204	193	193	193
2423	Shingle mills	.02	.01	.02	*144*	*144*	*144*	*132*	*132*	*132*
2424	Cooperage stock mills	.03	.03	.03	38	38	39	38	38	38
2425	Excelsior mills	.01	.01	.01	*137*	*137*	*137*	*125*	*125*	*125*
243	Millwork and related products	.53	.49	.59	158	157	159	(3)	(3)	(3)
2431	Millwork plants	.31	.29	.35	*142*	*141*	*143*	...	...	...
2432	Plywood plants	.17	.15	.19	177	177	178	180	179	180
2433	Prefabricated wood products	.05	.05	.05	190	188	192	201	199	203
244	Wooden containers	.30	.29	.30	*81*	*80*	*83*	(3)	(3)	(3)
2441	Fruit and vegetable baskets	.02	.02	.02	*89*	*88*	*90*	...	...	...
2442	Rattan and willow ware	.01	(5)	.01	*135*	*134*	*136*	...	...	...
2443	Cigar boxes	.01	.01	.01	*87*	*86*	*87*	...	...	...
2444	Wooden boxes	.22	.21	.22	*86*	*85*	*86*	...	...	...
2445	Cooperage	.04	.05	.04	50	50	49	58	58	57
249	Miscellaneous wood products	.32	.31	.34	*98*	*97*	*98*	(3)	(3)	(3)
2491	Wood preserving	.11	.10	.12	*76*	*75*	*77*	...	...	...
2492	Lasts and related products	.01	.01	.01	63	63	64	58	58	59
2493	Mirror and picture frames	.02	.02	.02	*166*	*164*	*167*	...	...	...
2499	Wood products, n.e.c	.18	.18	.19	*106*	*105*	*107*	...	...	...
	Estimated undercoverage	.14	.13	.16	...	...	...	...	...	...
25	Furniture and fixtures	1.76	1.73	1.80	124	122	125	(3)	(3)	(3)
251	Household furniture	1.18	1.16	1.21	123	123	123	(3)	(3)	(3)
2511	Wood furniture, not upholstered	.62	.61	.63	104	104	103	268	270	266
2512	Upholstered household furniture	.25	.25	.25	138	138	138	137	137	137
2514	Metal household furniture	.12	.12	.13	174	172	176	104	103	105
2515	Mattresses and bedsprings	.18	.17	.19	139	138	140	141	141	142
2519	Household furniture, n.e.c.**	.01	.01	.01	*97*	*96*	*98*	...	...	...

See footnotes at end of table.

Table 2.--PRODUCTION INDEXES AND WEIGHTS FOR MANUFACTURING INDUSTRIES: 1954--Continued

(1947 = 100)

Code	Industry group and industry	Proportions in 1947 based on unit values in[1]--			Production indexes: 1954 (1947 = 100)					
					Industry[2] indexes based on--			Product[2] indexes based on--		
		1954 and 1947	1954	1947	Cross weights	1954 weights	1947 weights	Cross weights	1954 weights	1947 weights
25	Furniture and fixtures--Continued									
252	Office furniture	.14	.15	.13	111	111	111	(3)	(3)	(3)
2521	Wood office furniture	.03	.04	.03	83	83	83	72	72	72
2522	Metal office furniture	.11	.11	.10	121	121	120	120	120	120
253	Public and professional furniture	.09	.08	.09	*166*	*164*	*168*	...	...	...
2531	Public-building furniture	.06	.05	.06	*183*	*181*	*185*	...	...	...
2532	Professional furniture**	.03	.03	.03	*137*	*135*	*138*	...	...	...
2541	Partitions and fixtures	.18	.18	.18	*141*	*139*	*142*	...	...	...
256	Screens, shades, and blinds**	.09	.08	.10	156	141	169	(3)	(3)	(3)
2561	Window and door screens	.02	.02	.02	144	144	144	155	155	155
2562	Window shades	.03	.03	.03	*98*	*97*	*99*	...	...	...
2563	Venetian blinds	.04	.03	.05	*215*	*194*	*230*	*188*	*170*	*201*
259	Furniture and fixtures, n.e.c.	.02	.02	.03	*128*	*127*	*130*	...	...	...
2591	Restaurant furniture	.02	.02	.02	*122*	*121*	*124*	...	...	...
2599	Furniture and fixtures, n.e.c.**	(5)	(5)	.01	*151*	*149*	*152*	...	...	...
	Estimated undercoverage	.06	.06	.06	...	...	...	...	...	...
26	Pulp, paper and products	3.82	3.81	3.83	131	131	132	(3)	(3)	(3)
261	Pulp, paper and board	1.90	1.90	1.90	133	133	133	(3)	(3)	(3)
2611	Pulp mills	.52	.50	.54	151	152	149	152	154	150
2612	Paper and paper board mills	1.25	1.27	1.23	126	125	126	126	125	126
2613	Building paper and board mills	.13	.13	.13	130	127	134	123	120	127
2641	Paper coating and glazing	.24	.25	.22	120	120	119	127	127	126
2651	Envelopes	.09	.09	.09	121	121	121	130	130	130
2661	Paper bags	.14	.13	.15	181	178	184	165	162	168
267	Paperboard containers	.84	.83	.87	126	126	126	(3)	(3)	(3)
2671	Paperboard boxes	.79	.77	.82	125	125	125	127	126	127
2674	Fiber cans, tubes, drums, etc	.05	.06	.05	139	140	138	146	147	145
269	Pulp, paper and board products, n.e.c.	.56	.57	.55	140	138	143	(3)	(3)	(3)
2691	Die-cut paper and board	.07	.07	.07	165	161	171	157	153	163
2693	Wallpaper	.04	.04	.04	49	49	49	49	49	49
2694	Pulp goods, pressed and molded	.01	.01	.01	*221*	*220*	*222*	...	...	...
2699	Paper and board products, n.e.c.	.44	.45	.43	143	140	145	141	138	143
	Estimated undercoverage	.05	.04	.05	...	...	...	...	...	...
27	Printing and publishing	5.47	5.38	5.58	126	126	127	(3)	(3)	(3)
2711	Newspapers	1.82	1.82	1.82	127	127	127	(4)	(4)	(4)
2721	Periodicals	.74	.67	.83	131	128	133	133	131	135
273	Books	.44	.45	.42	129	128	129	(3)	(3)	(3)
2731	Books: publishing and printing	.36	.37	.34	115	115	115	116	116	116
2732	Book printing**	.08	.08	.08	*192*	*192*	*192*	...	...	...
2741	Miscellaneous publishing	.09	.09	.09	*184*	*184*	*184*	...	...	...
2751	Commercial printing	1.24	1.22	1.26	*120*	*120*	*120*	...	...	...
2761	Lithographing	.39	.38	.41	*162*	*162*	*162*	...	...	...
2771	Greeting cards	.10	.10	.10	*139*	*139*	*139*	...	...	...
278	Bookbinding and related industries	.23	.23	.23	*94*	*94*	*94*	(3)	(3)	(3)
2781	Bookbinding	.11	.11	.11	*80*	*80*	*80*	...	...	...
2782	Blankbooks and paper ruling**	.05	.05	.05	*108*	*108*	*108*	...	...	...
2783	Loose-leaf binders and devices*	.05	.05	.05	*112*	*112*	*112*	...	...	...
2789	Miscellaneous bookbinding work	.02	.02	.02	*107*	*107*	*107*	...	...	...
279	Printing trades services	.34	.34	.34	*117*	*117*	*117*	(3)	(3)	(3)
2791	Typesetting	.09	.09	.09	*133*	*133*	*134*	...	...	...
2792	Engraving and plate printing	.04	.04	.04	*110*	*110*	*111*	...	...	...
2793	Photoengraving	.15	.15	.15	*108*	*107*	*108*	...	...	...
2794	Electrotyping and stereotyping	.06	.06	.06	*121*	*121*	*121*	...	...	...
	Estimated undercoverage	.08	.08	.08	...	...	...	...	...	...
28	Chemicals and products	6.76	6.45	7.12	164	160	169	(3)	(3)	(3)
281	Inorganic chemicals	.70	.72	.68	219	207	234	(3)	(3)	(3)
2811	Sulfuric acid	.53	.53	.53	243	229	259	187	184	192
2819	Inorganic chemicals, n.e.c.[6]	.17	.19	.15	145	145	145	140	140	141

See footnotes at end of table.

Table 2.--PRODUCTION INDEXES AND WEIGHTS FOR MANUFACTURING INDUSTRIES: 1954--Continued

(1947 = 100)

Code	Industry group and industry	Proportions in 1947 based on unit values in[1]--			Production indexes: 1954 (1947 = 100)					
					Industry[2] indexes based on--			Product[2] indexes based on--		
		1954 and 1947	1954	1947	Cross weights	1954 weights	1947 weights	Cross weights	1954 weights	1947 weights
28	Chemicals and products--Continued									
282	Organic chemicals	1.95	1.90	2.01	186	184	189	(3)	(3)	(3)
2821	Cyclic (coal-tar) crudes**	.03	.03	.02	88	88	89	82	81	82
2822	Intermediates and organic colors* **	.36	.38	.34	108	103	115	132	126	140
2823	Plastics materials	.27	.27	.27	254	237	273	258	241	277
2824	Synthetic rubber	.13	.14	.13	115	115	115	122	122	122
2825	Synthetic fibers	.51	.46	.56	169	169	169	168	168	168
2826	Explosives[6]	.10	.11	.10	*210*	*209*	*212*	*222*	*221*	*224*
2829	Organic chemicals, n.e.c.	.55	.51	.59	237	248	227	220	230	210
283	Drugs and medicines	.84	.74	.97	*195*	*195*	*195*	(3)	(3)	(3)
2831	Biological products**	.02	.02	.02	*191*	*191*	*191*	...	...	...
2833	Medicinal chemicals (including botanicals)* **	.13	.11	.16	*137*	*137*	*137*	...	...	...
2834	Pharmaceutical preparations	.69	.61	.79	*206*	*206*	*206*	...	...	...
284	Soap and related products**	.78	.77	.79	131	117	147	(3)	(3)	(3)
2841	Soap and glycerin**	.58	.57	.58	109	97	120	101	90	111
2842	Cleaning and polishing products**	.18	.18	.18	205	179	237	236	205	272
2843	Sulfonated oils and assistants*	.02	.02	.03	135	134	135	145	145	145
285	Paints and allied products	.87	.90	.83	107	107	107	(3)	(3)	(3)
2851	Paints and varnishes	.67	.68	.65	110	110	110	111	111	111
2852	Inorganic color pigments	.19	.21	.17	96	97	94	103	104	101
2853	Whiting and fillers**	.01	.01	.01	115	110	120	139	133	145
286	Gum and wood chemicals	.08	.07	.10	117	116	118	(3)	(3)	(3)
2861	Hardwood distillation	.01	.01	.01	93	96	89	83	86	80
2862	Softwood distillation*	.06	.05	.08	130	131	129	119	119	118
2863	Gum naval stores	(5)	(5)	(5)	72	72	72	69	70	69
2865	Tanning and dyeing materials	.01	.01	.01	*66*	*68*	*64*	*53*	*54*	*51*
2871	Fertilizers									
2872	Fertilizers, mixing only	.21	.18	.24	153	154	153	157	158	157
288	Vegetable and animal oils	.44	.29	.61	146	144	147	(3)	(3)	(3)
2881	Cottonseed oil mills	.10	.07	.14	168	168	168	177	177	177
2882	Linseed oil mills	.03	.01	.05	132	128	134	205	199	208
2883	Soybean oil mills	.10	.07	.14	181	179	182	138	137	139
2884	Vegetable oil mills, n.e.c.*	.07	.04	.10	66	66	66	53	53	53
2886	Grease and tallow**	.10	.07	.14	148	139	153	137	129	142
2887	Fatty acids* **	.02	.02	.02	137	112	155	114	93	129
2889	Animal oils, n.e.c.**	.02	.01	.02	*151*	*147*	*155*	...	...	...
289	Chemical products, n.e.c.	.89	.88	.89	143	139	148	(3)	(3)	(3)
2891	Printing ink	.07	.07	.07	129	130	129	133	133	132
2892	Essential oils**	.01	.01	.02	65	66	63	106	109	104
2893	Toilet preparations	.30	.30	.30	154	153	155	148	147	148
2894	Glue and gelatin**	.08	.08	.08	93	86	101	115	106	125
2895	Carbon black	.06	.06	.06	106	109	103	101	104	98
2896	Compressed and liquefied gases	.09	.08	.09	146	146	146	145	145	144
2897	Insecticides and fungicides	.03	.03	.03	286	261	311	234	214	255
2898	Salt	.05	.05	.03	100	99	102	107	106	109
2899	Chemical products, n.e.c.**	.20	.20	.21	*156*	*147*	*166*	*152*	*144*	*162*
29	Petroleum and coal products	2.31	2.18	2.48	131	130	132	(3)	(3)	(3)
2911	Petroleum refining	1.72	1.54	1.94	141	142	140	138	139	137
2992	Lubricants, n.e.c.									
293	Coke and byproducts	.38	.44	.32	92	92	91	(3)	(3)	(3)
2931	Beehive coke ovens**	.03	.03	.03	10	10	10	9	10	9
2932	Byproducts coke ovens	.35	.41	.29	98	98	98	98	98	98
295	Paving and roofing materials	.19	.18	.20	119	118	119	(3)	(3)	(3)
2951	Paving mixtures and blocks	.03	.03	.03	*206*	*206*	*205*	*175*	*176*	*175*
2952	Roofing felts and coatings	.16	.15	.17	104	103	104	102	101	102
2999	Petroleum and coal products, n.e.c.**	.02	.02	.02	*113*	*113*	*113*	*127*	*127*	*127*
30	Rubber products	1.78	1.86	1.68	114	111	117	(3)	(3)	(3)
3011	Tires and inner tubes	.93	1.00	.84	92	92	92	86	85	86
3021	Rubber footwear	.16	.16	.16	69	69	68	84	84	84
3031	Reclaimed rubber**	.01	.01	.01	209	210	208	91	92	91
3099	Rubber industries, n.e.c.	.68	.69	.67	152	147	158	152	147	158
31	Leather and leather goods	2.02	2.01	2.04	90	89	90	(3)	(3)	(3)
3111	Leather tanning and finishing	.45	.39	.52	82	81	82	78	77	79
3121	Industrial leather belting	.03	.03	.04	*106*	*106*	*106*	...	...	...
3131	Footwear cut stock	.11	.11	.11	83	84	83	82	83	82

See footnotes at end of table.

Table 2.--PRODUCTION INDEXES AND WEIGHTS FOR MANUFACTURING INDUSTRIES: 1954--Continued

(1947 = 100)

Code	Industry group and industry	Proportions in 1947 based on unit values in[1]--			Production indexes: 1954 (1947 = 100)					
					Industry[2] indexes based on--			Product[2] indexes based on--		
		1954 and 1947	1954	1947	Cross weights	1954 weights	1947 weights	Cross weights	1954 weights	1947 weights
31	Leather and leather goods--Continued									
314	Footwear, except rubber	1.10	1.17	1.02	91	91	92	(3)	(3)	(3)
3141	Footwear, except rubber	1.06	1.13	.97	90	90	90	91	90	91
3142	House slippers	.04	.04	.05	123	122	125	113	112	114
315	Leather gloves	.04	.04	.04	71	72	69	(3)	(3)	(3)
3151	Leather dress gloves	.03	.03	.03	59	61	58	51	52	50
3152	Leather work gloves	.01	.01	.01	99	98	101	101	99	102
3161	Luggage	.09	.08	.09	127	123	130	111	108	115
317	Purses and small leather goods	.11	.10	.13	135	134	136	(3)	(3)	(3)
3171	Handbags and purses	.09	.08	.10	132	132	132	128	128	128
3172	Small leather goods	.02	.02	.03	145	138	151	149	142	156
319	Miscellaneous leather goods	.04	.04	.04	79	78	81	(3)	(3)	(3)
3192	Saddlery, harness, and whips	.01	.01	.01	*44*	*44*	*44*	*46*	*46*	*46*
3199	Leather goods, n.e.c	.03	.03	.03	*96*	*95*	*96*	...	...	...
	Estimated undercoverage	.05	.05	.05	...	...	...	...	...	...
32	Stone, clay, and glass products	3.23	3.37	3.06	124	123	125	(3)	(3)	(3)
3211	Flat glass	.22	.22	.21	123	123	124	125	124	126
322	Pressed and blown glassware	.60	.65	.55	113	111	114	(3)	(3)	(3)
3221	Glass containers	.37	.41	.33	100	99	102	99	98	100
3229	Pressed and blown glass, n.e.c	.23	.24	.22	*132*	*132*	*133*	*125*	*125*	*126*
3231	Products of purchased glass	.16	.15	.17	138	138	137	168	169	167
3241	Cement, hydraulic	.38	.42	.32	136	136	136	142	142	142
325	Structural clay products	.38	.40	.36	116	116	118	(3)	(3)	(3)
3251	Brick and hollow tile	.15	.15	.14	132	132	132	130	130	129
3253	Floor and wall tile	.04	.04	.04	180	179	180	159	159	160
3254	Sewer pipe	.05	.05	.05	118	118	118	126	126	126
3255	Clay refractories	.11	.13	.10	78	78	78	74	73	74
3259	Structural clay products, n.e.c.**	.03	.03	.03	97	97	97	102	102	102
326	Pottery and related products	.31	.32	.29	89	88	89	(3)	(3)	(3)
3261	Vitreous plumbing fixtures	.06	.07	.06	129	129	129	131	131	131
3262	Vitreous-china food utensils	.05	.05	.04	78	77	79	78	78	80
3263	Earthenware food utensils	.08	.08	.07	67	67	67	76	76	76
3264	Porcelain electrical supplies	.07	.07	.07	*81*	*81*	*82*	...	...	...
3265	China decorating for the trade	.01	.01	.01	*34*	*33*	*34*	...	...	...
3269	Pottery products, n.e.c	.04	.04	.04	*104*	*103*	*105*	...	...	...
327	Concrete and plaster products	.44	.44	.45	174	174	174	(3)	(3)	(3)
3271	Concrete products	.24	.23	.26	188	188	188	173	173	173
3272	Gypsum products	.10	.10	.09	177	176	178	172	171	173
3274	Lime	.05	.05	.05	115	115	115	106	106	106
3275	Mineral wool	.05	.06	.05	162	172	150	153	163	142
3281	Cut-stone and stone products	.06	.06	.05	*231*	*231*	*231*	...	...	...
329	Nonmetallic mineral products, n.e.c	.60	.62	.58	116	115	118	(3)	(3)	(3)
3291	Abrasive products	.18	.18	.17	112	112	111	110	111	109
3292	Asbestos products	.15	.15	.15	137	133	142	133	129	138
3293	Gaskets and asbestos insulations**	.09	.09	.09	*95*	*95*	*96*	*97*	*97*	*97*
3295	Minerals: ground or treated	.07	.08	.07	*124*	*123*	*125*	...	...	...
3297	Nonclay refractories	.08	.09	.07	94	94	96	97	96	99
3298	Statuary and art goods	.01	.01	.01	*88*	*87*	*89*	...	...	...
3299	Nonmetallic mineral products, n.e.c	.02	.02	.02	*177*	*177*	*177*	...	...	...
	Estimated undercoverage	.08	.09	.08	...	...	...	...	...	...
33	Primary metal industries	8.75	9.85	7.42	103	103	104	(3)	(3)	(3)
331	Blast furnaces and steel mills	4.64	5.38	3.75	104	104	104	(3)	(3)	(3)
3311	Blast furnaces	.10	.13	.07	99	99	99	99	99	100
3313	Electrometallurgical products									
3312	Steel works and rolling mills	4.54	5.25	3.68	104	104	104	104	104	104
3393	Welded and heavy-riveted pipe									
3399	Primary metal industries, n.e.c									
332	Iron and steel foundries	1.61	1.74	1.45	83	83	84	(3)	(3)	(3)
3321	Gray-iron foundries	1.05	1.12	.95	81	81	82	83	83	84
3322	Malleable-iron foundries	.15	.15	.16	99	99	99	99	99	99
3323	Steel foundries	.41	.47	.34	82	82	82	77	78	77

See footnotes at end of table.

Table 2.--PRODUCTION INDEXES AND WEIGHTS FOR MANUFACTURING INDUSTRIES: 1954—Continued

(1947 = 100)

Code	Industry group and industry	Proportions in 1947 based on unit values in[1]--			Production indexes: 1954 (1947 = 100)					
					Industry[2] indexes based on--			Product[2] indexes based on--		
		1954 and 1947	1954	1947	Cross weights	1954 weights	1947 weights	Cross weights	1954 weights	1947 weights
33	Primary metal industries--Continued									
333	Primary nonferrous metals	.38	.39	.37	174	169	180	([3])	([3])	([3])
3331	Primary copper	.14	.16	.12	105	105	105	98	98	98
3332	Primary lead	.04	.03	.05	112	113	112	100	100	100
3333	Primary zinc	.09	.08	.10	114	114	114	100	100	100
3334	Primary aluminum	.10	.11	.08	262	262	262	255	255	255
3339	Primary nonferrous metals, n.e.c.**	.01	.01	.02	880	892	873	521	528	517
3341	Secondary nonferrous metals**	.17	.18	.15	85	84	85	86	85	86
335	Nonferrous rolling and drawing	.75	.83	.65	112	112	113	([3])	([3])	([3])
3351	Copper rolling and drawing	.45	.50	.39	91	91	91	94	94	94
3352	Aluminum rolling and drawing	.23	.26	.20	141	139	144	129	127	132
3359	Rolling and drawing, n.e.c.	.07	.07	.06	*152*	*153*	*150*	...	...	...
3361	Nonferrous foundries	.44	.48	.39	107	107	108	104	103	105
339	Primary metal industries, n.e.c.**	.76	.85	.66	99	98	100	([3])	([3])	([3])
3391	Iron and steel forgings**	.29	.32	.25	105	104	106	99	98	100
3392	Wire drawing**	.47	.53	.41	96	95	97	100	100	101
34	Fabricated metal products	6.90	7.23	6.51	114	113	116	([3])	([3])	([3])
3411	Tin cans and other tinware	.34	.39	.30	135	135	135	137	137	138
342	Cutlery, tools, and hardware	1.02	1.08	.94	105	104	106	([3])	([3])	([3])
3421	Cutlery	.13	.13	.14	100	99	101	91	90	92
3422	Edge tools	.06	.06	.05	*83*	*82*	*85*	*83*	*82*	*85*
3423	Hand tools, n.e.c.	.26	.29	.22	61	61	62	65	65	66
3424	Files	.03	.03	.03	77	77	77	80	80	80
3425	Hand-saws and saw blades*	.06	.07	.05	83	81	86	70	68	73
3429	Hardware, n.e.c.	.48	.50	.45	137	138	136	135	136	133
343	Heating and plumbing equipment	1.04	1.05	1.03	87	85	89	([3])	([3])	([3])
3431	Plumbing fixtures and fittings	.22	.23	.21	115	115	116	115	114	116
3439	Heating and cooking equipment, n.e.c.	.82	.82	.82	79	77	82	84	81	86
344	Structural metal products	1.55	1.59	1.51	150	147	154	([3])	([3])	([3])
3441	Structural and ornamental work	.62	.65	.58	151	148	154	158	155	162
3442	Metal doors, sash, and trim	.17	.17	.17	231	217	249	229	215	247
3443	Boiler shop products	.46	.45	.47	*133*	*133*	*133*	*138*	*138*	*138*
3444	Sheet-metal work	.30	.32	.29	*130*	*129*	*132*	...	...	...
346	Metal stamping and coating	1.20	1.26	1.12	*107*	*107*	*108*	([3])	([3])	([3])
3461	Vitreous-enameled products* **	.06	.06	.05	*71*	*70*	*72*	...	...	...
3462	Metal stamping	.90	.95	.84	*106*	*105*	*106*	*97*	*96*	*97*
3465	Enameling and lacquering	.02	.02	.02	*140*	*139*	*142*	...	...	...
3466	Galvanizing	.02	.02	.02	*90*	*89*	*82*	...	...	...
3467	Engraving on metal	.02	.02	.02	*97*	*96*	*99*	...	...	...
3468	Plating and polishing	.18	.19	.17	*125*	*124*	*127*	...	...	...
3471	Lighting fixtures	.33	.34	.31	*102*	*101*	*104*	...	...	...
348	Fabricated wire products**	.40	.42	.36	111	109	113	([3])	([3])	([3])
3481	Nails and spikes**	.02	.02	.02	87	86	89	83	82	84
3489	Wirework, n.e.c.**	.38	.40	.34	112	110	115	109	108	112
349	Metal products, n.e.c.	.91	.98	.83	116	114	119	([3])	([3])	([3])
3491	Metal barrels, drums, and pails	.09	.11	.08	87	87	87	82	82	82
3492	Safes and vaults	.03	.03	.03	*95*	*95*	*96*	*82*	*82*	*82*
3493	Steel springs*	.06	.06	.06	95	93	96	75	74	76
3494	Bolts, nuts, washers, and rivets	.43	.47	.37	94	94	94	91	91	91
3495	Screw machine products	.19	.20	.19	*134*	*133*	*136*	...	...	...
3496	Collapsible tubes	.02	.02	.02	119	116	123	131	127	136
3497	Metal foil	.03	.03	.03	*253*	*254*	*252*	*229*	*230*	*227*
3499	Fabricated metal products, n.e.c.*	.06	.06	.05	*241*	*238*	*245*	...	...	...
	Estimated undercoverage	.11	.12	.11	...	...	...	...	...	...
35	Machinery, except electrical	10.98	11.51	10.34	116	114	119	([3])	([3])	([3])
351	Engines and turbines	.53	.56	.51	128	128	129	([3])	([3])	([3])
3511	Steam engines and turbines	.14	.17	.11	204	191	226	234	218	259
3519	Internal combustion engines	.39	.39	.40	*102*	*101*	*103*	*103*	*102*	*105*
352	Tractors and farm machinery	1.11	1.23	.97	94	92	98	([3])	([3])	([3])
3521	Tractors	.51	.58	.43	95	96	93	99	100	97
3522	Farm machinery (except tractors)	.60	.65	.54	94	88	101	95	89	103
353	Construction and mining machinery	.91	.96	.85	101	99	102	([3])	([3])	([3])
3531	Construction and mining machinery	.67	.70	.63	89	87	91	94	92	96
3532	Oil-field machinery and tools	.24	.26	.22	134	133	136	134	133	136

See footnotes at end of table.

Table 2.--PRODUCTION INDEXES AND WEIGHTS FOR MANUFACTURING INDUSTRIES: 1954—Continued

(1947 = 100)

Code	Industry group and industry	Proportions in 1947 based on unit values in[1]--			Production indexes: 1954 (1947 = 100)					
					Industry[2] indexes based on--			Product[2] indexes based on--		
		1954 and 1947	1954	1947	Cross weights	1954 weights	1947 weights	Cross weights	1954 weights	1947 weights
35	Machinery, except electrical--Continued									
354	Metalworking machinery	1.63	1.76	1.49	139	138	141	(3)	(3)	(3)
3541	Machine tools	.50	.56	.43	141	142	140	150	151	149
3542	Metalworking machinery	.45	.49	.40	*108*	*108*	*109*	*111*	*110*	*111*
3544	Special dies and tools**	.68	.71	.66	*158*	*155*	*162*	*130*	*129*	*131*
3545	Metalworking machinery attachments									
355	Special-industry machinery, n.e.c.	1.49	1.58	1.36	84	83	87	(3)	(3)	(3)
3551	Food-products machinery	.27	.29	.25	*97*	*96*	*97*	*64*	*63*	*64*
3552	Textile machinery	.36	.37	.33	*64*	*63*	*66*	*47*	*44*	*51*
3553	Woodworking machinery	.13	.13	.12	*84*	*82*	*86*	...	...	...
3554	Paper-industries machinery	.11	.13	.10	*100*	*98*	*102*	...	...	...
3555	Printing-trades machinery	.22	.24	.18	*80*	*77*	*85*	*75*	*72*	*80*
3559	Special-industry machinery, n.e.c.**	.40	.42	.38	*92*	*90*	*94*	...	...	...
356	General industrial machinery	1.68	1.78	1.55	113	113	114	(3)	(3)	(3)
3561	Pumps and compressors	.42	.46	.38	116	117	115	118	119	116
3562	Elevators and escalators	.09	.09	.09	*126*	*126*	*126*	...	...	...
3563	Conveyors	.21	.24	.19	130	129	131	124	124	126
3564	Blowers and fans	.11	.12	.11	*143*	*140*	*146*	...	...	...
3565	Industrial trucks and tractors	.11	.12	.10	111	111	110	113	114	113
3566	Power-transmission equipment	.38	.39	.36	108	108	109	104	104	105
3567	Industrial furnaces and ovens	.06	.06	.05	146	145	147	165	164	166
3568	Mechanical stokers* **	.04	.04	.03	*24*	*25*	*23*	*30*	*31*	*29*
3569	General industrial machinery, n.e.c.**	.26	.26	.24	*89*	*87*	*91*	...	...	...
357	Office and store machines	.63	.60	.65	142	138	146	(3)	(3)	(3)
3571	Computing and related machines	.27	.24	.29	*185*	*186*	*184*	*152*	*153*	*151*
3572	Typewriters	.15	.14	.16	101	98	105	85	82	88
3576	Scales and balances	.05	.05	.05	88	86	90	86	84	88
3579	Office and store machines, n.e.c.	.16	.17	.15	*125*	*121*	*130*	*107*	*104*	*112*
358	Service and household machines	1.45	1.44	1.47	121	116	127	(3)	(3)	(3)
3581	Domestic laundry equipment	.21	.21	.21	110	106	114	129	124	134
3582	Laundry and dry-cleaning machinery	.08	.09	.07	71	68	75	57	55	61
3583	Sewing machines	.09	.09	.09	81	81	81	88	87	88
3584	Vacuum cleaners	.13	.13	.12	75	75	76	73	73	74
3585	Refrigeration machinery	.76	.73	.80	150	144	155	151	146	157
3586	Measuring and dispensing pumps*	.09	.10	.09	69	69	70	64	63	65
3589	Service and household machines, n.e.c.	.09	.09	.09	108	102	115	113	107	121
359	Miscellaneous machinery parts	1.42	1.46	1.37	142	141	144	(3)	(3)	(3)
3591	Valves and fittings, except plumbing	.54	.57	.51	107	107	108	116	115	117
3592	Fabricated pipe and fittings	.08	.09	.08	*149*	*147*	*153*	...	...	...
3593	Ball and roller bearings	.32	.31	.33	119	118	119	...	...	...
3594	Industrial patterns and molds**	.08	.08	.07	*214*	*210*	*219*	...	...	...
3599	Machine shops	.40	.41	.38	*193*	*190*	*198*	...	...	...
	Estimated undercoverage	.13	.14	.12	...	...	...	...	...	...
36	Electrical machinery	5.02	5.00	5.04	165	156	175	(3)	(3)	(3)
361	Electrical industrial apparatus	2.17	2.24	2.08	133	133	134	(3)	(3)	(3)
3611	Wiring devices and supplies	.28	.29	.28	*132*	*129*	*136*	*103*	*102*	*105*
3612	Carbon and graphite products	.05	.05	.05	*140*	*137*	*144*	...	...	...
3613	Electrical measuring instruments	.14	.13	.14	*204*	*199*	*209*	...	...	...
3614	Motors and generators	.79	.81	.77	106	108	104	126	128	123
3615	Transformers	.27	.29	.25	153	152	153	153	152	153
3616	Electrical control apparatus	.51	.55	.47	138	138	138	143	143	143
3617	Electrical welding apparatus	.07	.06	.07	131	130	133	116	115	118
3619	Electrical industrial apparatus, n.e.c.**	.06	.06	.05	*214*	*209*	*220*	...	...	...
3621	Electrical appliances**	.30	.30	.30	154	155	154	134	134	133
3631	Insulated wire and cable**	.12	.12	.13	*97*	*95*	*99*	...	...	...
3641	Engine electrical equipment	.27	.27	.26	135	133	137	121	120	123
3651	Electric lamps (bulbs)	.18	.19	.16	123	119	128	122	119	127
366	Communication equipment	1.65	1.55	1.78	235	216	255	(3)	(3)	(3)
3661	Radios and related products	.94	.89	1.00	264	245	286	288	267	311
3662	Electronic tubes	.13	.14	.12	*475*	*357*	*659*	*485*	*364*	*672*
3663	Phonograph records	.08	.07	.10	100	92	107	35	32	37
3664	Telephone and telegraph equipment	.44	.39	.50	*136*	*136*	*136*	*143*	*143*	*143*
3669	Communication equipment, n.e.c.	.06	.06	.06	*125*	*122*	*129*	...	...	...
369	Electrical products, n.e.c.	.33	.33	.33	101	100	102	(3)	(3)	(3)
3691	Storage batteries	.14	.13	.15	105	105	104	104	105	105
3692	Primary batteries	.06	.06	.06	108	107	109	114	113	115
3693	X-ray and therapeutic apparatus	.06	.07	.05	*88*	*87*	*88*	*57*	*57*	*57*
3699	Electrical products, n.e.c.**	.07	.07	.07	*98*	*96*	*101*	...	...	...

See footnotes at end of table.

Table 2.--PRODUCTION INDEXES AND WEIGHTS FOR MANUFACTURING INDUSTRIES: 1954--Continued

(1947 = 100)

Code	Industry group and industry	Proportions in 1947 based on unit values in[1]--			Production indexes: 1954 (1947 = 100)					
					Industry[2] indexes based on--			Product[2] indexes based on--		
		1954 and 1947	1954	1947	Cross weights	1954 weights	1947 weights	Cross weights	1954 weights	1947 weights
37	Transportation equipment	7.87	8.04	7.68	189	182	197	(3)	(3)	(3)
371	Motor vehicles and equipment	5.20	5.40	4.97	124	123	126	(3)	(3)	(3)
3713	Truck and bus bodies	.15	.14	.17	*86*	*87*	*85*	*90*	*90*	*89*
3715	Truck trailers	.09	.09	.08	*141*	*139*	*144*	...	...	...
3716	Automobile trailers	.06	.06	.07	*127*	*124*	*130*	*129*	*126*	*133*
3717	Motor vehicles and parts	4.90	5.11	4.65	125	124	128	128	126	130
372	Aircraft and parts	1.22	1.21	1.24	*583*	*560*	*610*	(3)	(3)	(3)
3721	Aircraft	.79	.80	.79	*479*	*453*	*518*	(4)	(4)	(4)
3722	Aircraft engines	.31	.30	.33	*520*	*519*	*521*	(4)	(4)	(4)
3723	Aircraft propellers	.03	.03	.03	*348*	*347*	*348*	...	...	...
3729	Aircraft equipment, n.e.c.**	.09	.08	.09	*1,828*	*1,825*	*1,833*	...	...	...
373	Ships and boats	.74	.72	.76	*114*	*116*	*113*	(3)	(3)	(3)
3731	Ship building and repairing	.66	.65	.67	*114*	*115*	*112*	(4)	(4)	(4)
3732	Boat building and repairing	.08	.07	.09	*119*	*121*	*118*	...	...	...
374	Railroad equipment	.59	.60	.59	60	59	63	(3)	(3)	(3)
3741	Locomotives and parts	.19	.19	.20	97	94	100	82	80	85
3742	Railroad and street cars	.40	.41	.39	43	43	43	56	56	56
3751	Motorcycles and bicycles	.09	.08	.09	54	54	54	51	51	51
3799	Transportation equipment, n.e.c.**	.03	.03	.03	*38*	*38*	*38*	*65*	*64*	*65*
38	Instruments and related products	1.51	1.54	1.48	152	149	156	(3)	(3)	(3)
3811	Scientific instruments**	.10	.10	.10	*389*	*379*	*402*	...	...	...
3821	Mechanical measuring instruments	.38	.41	.37	*149*	*145*	*154*	...	...	...
3831	Optical instruments and lenses	.04	.04	.04	*227*	*221*	*234*	...	...	...
384	Medical instruments and supplies	.26	.27	.25	*109*	*108*	*111*	(3)	(3)	(3)
3841	Surgical and medical instruments	.04	.04	.04	*118*	*117*	*120*	...	...	...
3842	Surgical appliances and supplies	.16	.17	.15	*112*	*111*	*114*	...	...	...
3843	Dental equipment and supplies	.06	.06	.06	*95*	*94*	*96*	...	...	...
3851	Ophthalmic goods	.12	.12	.11	96	97	95	97	98	96
3861	Photographic equipment	.37	.37	.36	166	161	171	158	153	163
387	Watches and clocks	.24	.23	.25	98	96	100	(3)	(3)	(3)
3871	Watches and clocks	.21	.20	.22	101	98	103	91	89	93
3872	Watchcases	.03	.03	.03	79	79	79	80	80	80
39	Miscellaneous manufactures	2.50	2.38	2.65	129	123	135	(3)	(3)	(3)
391	Jewelry and silverware	.37	.36	.39	90	89	91	(3)	(3)	(3)
3911	Jewelry (precious metal)	.16	.15	.18	106	106	106	105	105	105
3912	Jewelers' findings	.04	.04	.04	*80*	*79*	*82*	...	...	...
3913	Lapidary work	.01	.01	.01	*95*	*93*	*96*	...	...	...
3914	Silverware and plated ware	.16	.16	.16	75	75	76	68	67	68
393	Musical instruments and parts	.09	.08	.09	123	123	124	(3)	(3)	(3)
3931	Pianos	.03	.03	.04	106	106	106	99	99	99
3932	Organs**	.01	(5)	.01	*200*	*197*	*202*	...	...	...
3933	Piano and organ parts	.02	.02	.01	*152*	*150*	*155*	...	...	...
3939	Musical instruments, n.e.c.	.03	.03	.03	113	113	113	101	101	101
394	Toys and sporting goods	.35	.32	.38	163	159	166	(3)	(3)	(3)
3941	Games and toys, n.e.c.	.12	.11	.13	208	207	209	212	212	213
3942	Dolls	.05	.04	.05	178	177	180	182	181	183
3943	Children's vehicles	.05	.04	.06	*100*	*90*	*110*	*129*	*116*	*141*
3949	Sporting and athletic goods	.13	.13	.14	*139*	*136*	*143*	*138*	*135*	*142*
395	Office supplies	.19	.18	.21	130	119	141	(3)	(3)	(3)
3951	Pens and mechanical pencils	.10	.09	.12	126	104	145	124	102	143
3952	Lead pencils and crayons	.03	.03	.03	104	104	104	96	96	95
3953	Hand stamps and stencils	.02	.03	.02	*148*	*146*	*150*	...	...	...
3954	Artists' materials	.01	.01	.01	*151*	*150*	*154*	...	...	...
3955	Carbon paper and inked ribbons	.03	.02	.03	151	151	151	167	167	168
396	Costume jewelry and notions	.31	.28	.34	126	124	129	(3)	(3)	(3)
3961	Costume jewelry	.13	.12	.14	*120*	*118*	*122*	...	...	...
3962	Artificial flowers	.03	.03	.03	*108*	*107*	*110*	...	...	...
3963	Buttons	.04	.04	.04	113	113	113	116	116	115
3964	Needles, pins, and fasteners	.11	.09	.13	143	140	146	125	122	128
3971	Plastic products, n.e.c.	.30	.27	.34	*254*	*236*	*272*	...	...	...

See footnotes at end of table.

Table 2.--PRODUCTION INDEXES AND WEIGHTS FOR MANUFACTURING INDUSTRIES: 1954--Continued

(1947 = 100)

Code	Industry group and industry	Proportions in 1947 based on unit values in[1]--			Production indexes: 1954 (1947 = 100)					
					Industry[2] indexes based on--			Product[2] indexes based on--		
		1954 and 1947	1954	1947	Cross weights	1954 weights	1947 weights	Cross weights	1954 weights	1947 weights
398 399	Miscellaneous manufactures	.81	.81	.81	*100*	*99*	*102*	([3])	([3])	([3])
3981	Brooms and brushes	.12	.12	.11	82	82	82	84	83	84
3982	Cork products**	.02	.02	.02	*113*	*112*	*115*	...	...	...
3983	Matches	.04	.04	.04	95	92	98	96	93	99
3984	Candles	.01	.01	.01	*139*	*138*	*142*	...	...	...
3985	Fireworks and pyrotechnics	.01	.01	.01	*122*	*120*	*123*	...	...	...
3986	Jewelry and instrument cases	.03	.03	.03	*128*	*126*	*130*	...	...	...
3987	Lamp shades	.02	.02	.02	*120*	*119*	*122*	...	...	...
3988	Morticians' goods	.12	.12	.12	86	84	88	96	94	98
3991	Beauty and barber-shop equipment	.02	.02	.02	*69*	*68*	*70*	...	...	...
3992	Furs, dressed and dyed	.06	.06	.06	*47*	*46*	*47*	...	...	...
3993	Signs and advertising displays	.16	.16	.17	*147*	*145*	*149*	...	...	...
3994	Hairwork	.01	.01	.01	*143*	*142*	*145*	...	...	...
3995	Umbrellas, parasols, and canes	.02	.02	.02	*78*	*78*	*80*	...	...	...
3996	Tobacco pipes	.02	.02	.02	*47*	*46*	*47*	...	...	...
3997	Soda-fountain and bar equipment**	.02	.02	.02	*54*	*53*	*55*	...	...	...
3999	Miscellaneous products, n.e.c	.13	.13	.13	*100*	*99*	*102*	...	...	...
	Estimated undercoverage	.08	.08	.09	...	...	...	...	...	...
19	Ordnance and accessories	.11	.10	.11	*1,704*	*1,704*	*1,704*	...	...	...

*Value of primary product shipments by the plants classified in this industry is less than 75 percent of their total shipments of all products, both primary and secondary. This primary product "specialization" ratio is shown for all industries in Appendix B.

**Value of primary product shipments by the plants classified in this industry is less than 75 percent of the total shipments of these primary products by all industries. This "coverage" ratio is shown for all industries in Appendix B, Industry Coverage and Specialization Ratios.

[1]Represents the proportion or weight of each industry and industry group in the 1947 total value added by manufacture for all industries as measured, respectively, in average 1947 and 1954 prices, 1954 prices, and 1947 prices. This is equivalent in effect to (a) valuing the 1947 production of each industry, respectively, in terms of average 1947 and 1954 value added per unit, 1954 value added per unit, and 1947 value added per unit; (b) summing these values added to industry group levels; and (c) expressing them as proportions of the total for all manufacturing industries. (See Chapter 4.

For each major group in which a post-census field study indicated undercoverage in 1947, an estimate of such undercoverage at this level was made in terms of value added by manufacture. The undercoverage in individual industries could not be estimated.

[2]"Industry indexes" and "Product indexes" were designated in previous publications of benchmark production indexes as "adjusted" and "unadjusted" indexes, respectively.

The indexes shown in italics are considered to be of doubtful reliability, and are of three kinds:

(a) Indexes of the industry type that were estimated for "indirectly represented" industries (i.e., industries for which indexes could not be constructed directly from physical quantity data). These indexes were calculated by deflating the change between 1947 and 1954 in the value of shipments of each industry. In most cases, the deflator was based on the 1954 price index calculated for the "directly represented" industries in its major group taken as a whole. In a few cases, a more selective procedure was used in choosing a deflator; and in the "Instruments and Related Products" and "Miscellaneous Manufactures" industry groups some use was made of price indexes for several industry groups combined and for all manufacturing. Product-type indexes were not constructed for these industries.

(b) Indexes of the product type based on physical quantity data amounting in all to less than 40 percent of the total value of the given industry's primary products shipped by all industries. The corresponding industry-type indexes are also shown in italics.

(c) Indexes considered to be unreliable because of special conditions for which suitable adjustments could not be made in the data at hand.

The industries under these three headings are as follows:

Indirectly represented industries

2034	2389	2444	2694	2792	3269	3468	3594	3729	3932	3986
2216	2393	2491	2732	2793	3281	3471	3599	3732	3933	3987
2259	2394	2493	2741	2794	3295	3495	3612	3811	3953	3991
2283	2395	2499	2751	2831	3298	3499	3613	3821	3954	3992
2292	2396	2519	2761	2833	3299	3553	3619	3831	3961	3993
2312	2397	2531	2771	2834	3359	3554	3631	3841	3962	3994
2326	2398	2532	2781	2889	3444	3559	3669	3842	3971	3995
2338	2431	2541	2782	3121	3461	3562	3699	3843	3982	3996
2351	2441	2562	2783	3199	3465	3564	3715	3912	3984	3997
2371	2442	2591	2789	3264	3466	3569	3723	3913	3985	3999
2385	2443	2599	2791	3265	3467	3592				

Industries with less than 40 percent product coverage

2423	3443	3555
2425	3463	3568
2865	3492	3571
2899	3497	3579
2951	3519	3611
2999	3542	3713
3192	3544	3716
3229	3545	3799
3293	3551	3943
3422	3552	3949

Other industries with unreliable indexes

1900	2411
2015	2563
2026	2826
2027	3664
2036	3693
2037	3721
2392	3722
	3731

[3]Product-type indexes were not calculated for all manufacturing, major industry groups (2-digit), industry groups (3-digit), or indirectly represented industries (i.e., those for which indexes could not be constructed directly from physical quantity data.)

[4]For some of the industries for which product-type indexes could not be constructed owing to the lack of adequate physical quantity data, it was nevertheless possible to calculate industry indexes directly rather than treat them as indirectly represented industries. These industries are listed below, and the methods used for calculating their indexes are described in Chapter 6.

Industry	Industry
2026	3721
2027	3722
2411	3731
2711	

[5]Less than .005 percent.

[6]Includes data for Government-owned plants operated by private firms for the account of the Federal Government but excludes the activities of Government owned and/or operated plants.

CHAPTER 3. PROCEDURES AND PROBLEMS OF MEASUREMENT

The procedure followed in calculating the census index of manufactures is similar to that used in the earlier calculations of indexes based on Census of Manufactures data.

In general three operations were performed to obtain the indexes for manufacturing production:

(1) Calculation of product indexes based on physical output data.

(2) Calculation of industry indexes based, with certain adjustments, on aggregates of the product indexes. Weights used to obtain aggregates of product indexes were generally based on gross value of output.

(3) Calculation of indexes for industry groups and for total manufactures based, also with certain adjustments, on aggregates of the individual industry indexes. Weights used to combine industry indexes were based on value added.

Product Indexes

For 1954, as for 1947, data were collected in the Census of Manufactures on the quantity and value of output of individual products for almost all industries. Approximately 6,000 individual product items were separately classified for the 1947-54 calculations, as compared with approximately 1,700 available for the 1939-47 calculations. The term "product" as used in the Census of Manufactures represents the finest level of detail for which output information was requested, including therefore subclassifications by size, variety, etc., of individual commodities.

The list of products for which separate information was collected in the 1954 Census was based on the product categories selected for the 1947 Census of Manufactures. Hence, the large increase in product detail in the present calculations reflected improvements which had already been made in the year 1947, but could not be incorporated in the comparison with the less detailed data for the year 1939.

In the usual method for obtaining indexes for products, data for 1947 and 1954 were matched in as fine detail as the requirements of comparability permitted. This usually meant in the fullest detail published in table 6 of Volume II, "Industry Statistics" of the 1954 Census of Manufactures. Since certain unpublished detailed items of a confidential nature were available to census employees, even more than the published detail was used for certain indexes. Information from other government agencies and from certain private sources was used in certain cases to supplement census product data, as for example the production index for passenger autos which included data from outside the census on make, model, body style, and extra equipment. The product statistics pertained to the output of products wherever made and classified according to the industry in which they are primarily produced.

For products represented by both quantity and value data for 1947 and 1954 (called "Q" products), a different calculation procedure was used than for the products represented only by value data (called "N" products). For each of the "Q" products, values per unit for 1954 and 1947 were derived by dividing the values of products by the respective quantities.

Gross values for each of these "Q" products for 1954 and 1947 were then obtained in three sets of constant prices, as follows:

(a) In 1947 prices--calculations were needed only for the year 1954, obtained by multiplying 1954 quantities by 1947 unit values; the matching census value for the year 1947 was, of course, already in 1947 prices.

(b) In 1954 prices--calculations were needed only for the year 1947, obtained by multiplying 1947 quantities by 1954 unit values; the corresponding census value for the year 1954, was of course, already in 1954 prices.

(c) In average prices for 1954 and 1947--calculations were needed for both the year 1947 and 1954. For the year 1947, the 1947 value in 1947 prices (as given in the census) for each product was added to the 1947 value in 1954 prices as obtained in step "(b)" above. For the year 1954, values in average prices for each "Q" product were obtained by adding the 1954 value in 1954 prices (as given in the Census of Manufactures) to the 1954 value in 1947 prices as obtained in step "(a)" above.

To obtain similar values for those primary products for which unit values could not be calculated because of the absence of quantity information ("N" products) selected price indexes were used. In selecting such a price index an attempt was made to use information as closely related as possible to the "N" product in question. Accordingly, the following kinds of price indexes were used in the indicated order of preference:

(a) An index for an equivalent product directly priced in the Bureau of Labor Statistics (BLS) wholesale price index (WPI).

(b) An index derived from census data for closely related products or product groups for which adequate quantity data were available.

(c) An index for closely related products or product groups from the BLS wholesale price index.

"N" products accounted for approximately one-fourth of the 1954 value of primary products used in the calculation of product indexes. The detailed estimating of output for "N" products contributed to the wider coverage of product information in the present calculations compared to earlier ones. In earlier calculations product indexes were based only on "Q" products.

For each of the "N" products, a value of shipments or production for 1947 and 1954 in three sets of constant prices was obtained, as follows:

(a) In 1947 prices--for the year 1954, the census value as given was divided by the selected price index thus yielding a value for the year 1954 in 1947 prices.

(b) In 1954 prices--for the year 1947, the census value as given was converted to 1954 prices by multiplying it by a selected price index (taken as a ratio of the price in 1954 to that in 1947).

(c) In average prices of 1954 and 1947, the same procedure mentioned above for "Q" products was followed for each "N" product.

To obtain indexes of output of total primary products of an industry (the total of the "Q" plus "N" products) the aggregative type of index number formula, with three sets of weights, was used, as follows:

(a) In 1947 prices:

$$\frac{\Sigma q_{54} p_{47}}{\Sigma q_{47} p_{47}}$$

(b) In 1954 prices:

$$\frac{\Sigma q_{54} p_{54}}{\Sigma q_{47} p_{54}}$$

(c) In average prices of 1954 and 1947:

$$\frac{\Sigma q_{54}p_{54} + \Sigma q_{54}p_{47}}{\Sigma q_{47}p_{54} + \Sigma q_{47}p_{47}} = \frac{\Sigma q_{54}(p_{54} + p_{47})}{\Sigma q_{47}(p_{54} + p_{47})}$$

In which:

$q_{47}p_{47}$ —represents the 1947 value of shipments or production of a corresponding "Q" or "N" product.

$q_{54}p_{54}$ —represents the 1954 value of shipments or production of a given "Q" or "N" product.

$q_{54}p_{47}$:

For a "Q" product this represents 1954 quantities shipped or produced multiplied by the 1947 unit value.

For an "N" product this represents the 1954 value of shipments or production divided by a selected price index.

$q_{47}p_{54}$:

For a "Q" product this represents 1947 quantities times the 1954 unit value.

For an "N" product this represents the 1947 value of shipments or production multiplied by a selected price index.

Industry Indexes

The Census of Manufactures is conducted on an establishment basis. That is, a company operating establishments at more than one location is required to submit a separate report for each location; also, companies engaged in distinctly different lines of activity at one location are required to submit separate reports if the plant records permit such a separation and if the activities are of substantial size.

Each of the establishments covered by the census was classified in one of approximately 450 manufacturing industries in accordance with the Standard Industrial Classification System (SIC). As a result of certain combinations and rearrangements of industries, 436 separate industry indexes were obtained and are shown in table 2 of chapter 2.

Under the classification system used, an industry is generally defined as a group of establishments producing a single product or a more or less closely related group of products. The product groupings from which industry classifications are derived are based on such considerations as whether they are typically produced in the same establishment, similarity of manufacturing processes and types of material used. The "primary" products referred to above represent groups of products assigned to given industries. An establishment is classified in a particular industry if its production of the primary products of that industry exceeds in value its production of products of any other industry.

The general statistics (employment, inventories, value added, value of shipments, cost of materials, fuels, etc.) shown for an industry reflect not only the output of primary products of the establishments in that industry but also their activities of a secondary nature. The extent to which industries specialize in output of primary products (the specialization ratio) and the extent to which primary products are produced in the industry to which they are primary (the coverage ratio) are indicated in Appendix B.

Thus, the primary product indexes described above are not necessarily appropriate as indexes for their respective industries for two reasons: (1) the primary product statistics published in table 6 of the Census of Manufactures Volume II pertain to those products which, while representing the major output of an industry, also represent part of the output of other industries; and (2) since the industries concerned also produce products other than those primary to their operation, the output of primary products wherever made is not necessarily representative of the output of secondary products of the industry.

The standard method of calculating an individual industry index in this study involved the use of a price index based on primary products wherever made to deflate the change in value of all products made in the industry.

This operation is represented symbolically as follows:

(1) $\frac{\Sigma q_{54}p_{54}}{\Sigma q_{47}p_{47}}$: index of the change in the industry's value of output from 1947 to 1954

(2) $\frac{\Sigma q'_{54}p'_{54}}{\Sigma q'_{47}p'_{47}}$: index of the change in the value of output of primary products wherever made

(3) $\frac{\Sigma q'_{54}p'_{47}}{\Sigma q'_{47}p'_{47}}$: product index, i.e., the 1947 weighted production index for primary products wherever made, described earlier

(4) = (2) ÷ (3) = $\frac{\Sigma q'_{54}p'_{54}}{\Sigma q'_{54}p'_{47}}$: the 1954 weighted price index for primary products

It was assumed that a price index for primary products would show the same change as a price index for all products made in the industry, or that

(5) $\frac{\Sigma q'_{54}p'_{54}}{\Sigma q'_{54}p'_{47}} = \frac{\Sigma q_{54}p_{54}}{\Sigma q_{54}p_{47}}$

Hence,

(6) = (1) ÷ (4) = $\frac{\Sigma q_{54}p_{47}}{\Sigma q_{47}p_{47}}$: industry index, i.e., the desired industry production index with 1947 weights

The calculation of an industry index with 1954 weights involved the use in (3) of a production index for primary products with 1954 weights. This yielded in (4) a price index with 1947 weights and in (6) an industry index with 1954 weights.

An industry production index with weights based on average prices of 1954 and 1947 is represented symbolically as follows:

(7) $\frac{\Sigma q_{54}p_{54} + \Sigma q_{54}p_{47}}{\Sigma q_{47}p_{54} + \Sigma q_{47}p_{47}}$

in which the second term of the numerator represents the 1954 value of industry output converted to 1947 prices by a primary product price index with 1954 weights, and the first term of the denominator represents 1947 value of industry output converted to 1954 prices with a primary product price index with 1947 weights.[3]

The indexes calculated in this way were indexes of gross output--that is, they measured the change in the entire physical volume of the commodities covered, not just in that portion of the change in physical volume which was added in the manufacturing stage. It was assumed, however, that they also served as good approximations to the change in physical volume which was added in the manufacturing stage, and they were treated as such approximations in the calculation of indexes for groups of industries and for all manufacturing.

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[3] As pointed out in the earlier calculations for 1939 to 1947 the direct deflation of the industry value of output by a "cross weighted" price index would not yield a "cross weighted" production index but rather a chain link type of production index involving in the first link (with base year weights) the production change from the base year to the average of the two years; and the second (with current year weights) the production change from the average to the current year, or

$$\frac{\Sigma 1/2\ (q_{54} + q_{47})p_{47}}{\Sigma q_{47}p_{47}} \cdot \frac{\Sigma q_{54}p_{54}}{\Sigma 1/2\ (q_{54} + q_{47})p_{54}}$$

See Census of Manufactures: 1947, Indexes of Production, page 96. In this earlier volume this point is made in terms of a price index. The above formulation is in terms of a production index.

Group Indexes and the Indexes for All Manufacturing

The calculation of a group index, including the indexes for 3-digit groups, consisted in combining industry indexes with value added weights. This is indicated symbolically as follows:

(1) $\frac{\Sigma VA_{1954}}{\Sigma(VA_{1954} \div I_{1954})}$: Group and/or total index with 1954 weights, in which I_{54} (as a ratio) represents the industry indexes with 1954 weights and "VA" the value added in the subscript year.

(2) $\frac{\Sigma(I_{47} \cdot VA_{1947})}{\Sigma VA_{1947}}$: Group and/or total index with 1947 weights.

(3) $\frac{\Sigma VA_{1954} + \Sigma VA_{1947} \cdot I_{47}}{\Sigma VA_{1947} + \Sigma VA_{1954} \div I_{54}}$: Group and/or total index with weights based on the average value added per unit for 1954 and 1947.

Departures From Standard Procedures

The procedures described above dealt with the use of product indexes as a basis for obtaining industry indexes. Because of various data limitations, alternative procedures were required for a number of industries. The important departures from standard procedure are annotated for each such industry in chapter 6. In general, the industries which were treated in the standard manner according to the procedures outlined above ("directly represented by product data") accounted for 82.2 percent of value added in 1954, as shown in table A. An additional 3.4 percent of value added was accounted for by industries whose 1947-54 change in output was estimated from data on quantities of a major raw material consumed (e.g., newsprint consumption to estimate output of the newspaper industry.)

TABLE A.--IMPORTANCE OF INDUSTRY INDEXES, BY METHOD OF REPRESENTATION

Method of representation	Percent of total value added by manufacture in the index calculations for the years		
	1947-54	1939-47	1929-37
Total	100.0	100.0	100.0
Directly represented	85.6	75.4	60.4
By product data[1]	82.2	67.6	53.4
By materials consumed data	3.4	7.8	7.0
Indirectly represented	14.4	24.6	39.6
By group price index	7.3	(2)	(2)
By selected price index	7.1		

[1]As noted earlier, of the total value of products used in calculating product indexes, about 75 percent was based on use of physical quantity data ("Q" products). The remainder was based on deflated value data ("N" products).

[2]In the 1939-47 calculations, output of industries without direct representation was estimated on the assumption of similarity of change in output per man for represented and unrepresented industries. In the calculations for the earlier period the assumption of similarity in value added per unit change was used.

Where data were lacking for calculating output directly, two methods were used involving data from related industries. One method consisted in deflating within a major group the change in gross value of each "indirectly represented" industry by the aggregate change in gross value per unit of the directly represented industries of the group. Industries treated in this fashion accounted for 7.3 percent of value added.

The other method of treating "indirectly represented" industries involved a more selective deflation procedure. An important example is the plastics products industry in Major Group 39, Miscellaneous Manufactures. Instead of using a price index based on represented industries of this group, a price index based on plastic materials was used to deflate the gross value of output of this industry. Industry indexes treated selectively for deflation purposes accounted for 7.1 percent of total value added in 1954.

As the table shows, the present calculations reflect considerable increase over earlier ones as to the coverage of product data in the total index. It may be noted, however, that in certain areas of manufacturing, such as in the production of machinery, aircraft, and military equipment, output measurement is particularly complex. Moreover, it is in these areas of manufactures where increases in output have been exceptionally large that data improvements probably have not kept pace with data needs.

Industry indexes which were considered to be based on inadequate information are shown in italics in table 2 of chapter 2. Included among these are mainly: (a) indexes for each of the "indirectly represented" industries, and (b) indexes for which the coverage of "Q" products plus those "N" products deflated by a directly priced item in the WPI was less than 40 percent of the total value in 1954 of primary products classified in that industry.

Problems of Measurement

Various problems of a conceptual and statistical nature were associated with the above procedures, which required special adjustments in the data at hand. The major adjustments are noted below together with discussion of limitations of the measures finally obtained.

Undercoverage in 1947.--A field study designed to check the coverage of the 1947 Census indicated that 98.2 percent of total manufacturing employment and 98.7 of total wages and salaries were covered in the 1947 Census statistics. For the 1954 Census, various checks made during the processing of reports indicated that virtually complete coverage was obtained.

Accordingly, upward adjustments were made in the 1947 value added figures for total manufacturing and for major industry groups. It was not found feasible, however, to determine which individual industries were responsible for the undercoverage within a major group. Adjustments were based almost entirely on the degree of undercoverage of total salaries and wages in each major group as estimated by the Bureau of the Census. For total manufacturing the 1947 value added figures were raised by 1.4 percent which, in effect, reduced the 1954 index relative to 1947 (with three sets of weights) by the same percentage.

The percentage increase in the 1947 value added figures varied by major group, with the largest increases amounting to about 4 percent in the groups for apparel, lumber, furniture, and miscellaneous manufactures. A sizable proportion of business in these groups is typically carried on in small establishments, in which most of the undercoverage was believed to exist. In the case of apparel the indicated undercoverage based on salaries and wages was 3.5 percent, but was increased to 4.3 percent on a value added basis, because it was found that in small establishments in this group the ratio of value added to salaries and wages was higher than in large establishments. Differences in this ratio between large and small establishments generally appeared to be quite small in other industry groups.

An appreciable amount of the total undercoverage was also apparent in the large food group which was estimated, in total, at approximately 2 percent but which may have been concentrated in large part in poultry dressing establishments. Since, as already noted, it was not found feasible to correct the individual industry or product indexes for undercoverage, the production index for poultry dressing is probably too high. The indexes shown for this industry are italicized.

The estimated percent of total 1947 value added accounted for by the establishments in each group that were not covered in the census is indicated in table 2 of chapter 2, expressed as weights in the total index.

Inventory changes.--For most industries, the Census Bureau collects data referring to quantities and values of shipments, rather than quantities and values of production, with the difference between the two consisting of net additions to or subtractions from inventory. Inasmuch as 1947 was a year of widespread inventory accumulation and 1954 one of widespread inventory liquidation, indexes based on shipments during the two years would generally be higher than indexes based on production. Accordingly, the indexes in this volume were put on a production rather than a shipments basis wherever the difference between the two seemed likely to be important. It is estimated that about two-thirds or more of the total inventory change during the two years has been taken into account in the benchmark indexes.

For certain industries--the canning and preserving and tobacco industries and many of the apparel industries--the Census collects only production data, and no inventory adjustment was needed. For 65 of the remaining industries, one of two methods was used to measure production rather than shipments. The first method was applied to 45 industries for which the census collects quantity data on both a production and a shipments basis, but value data on only a shipments basis. Quantities of production were multiplied by unit values of shipments to estimate the value of production of primary products, and thus to build up "product" indexes based on production. Then the ratio of the estimated total value of primary products produced to the total value of primary products shipped was applied to the industry value of shipments in order to estimate industry value of production and to calculate "industry" indexes based on production. Industry value added figures were also recalculated to refer to production rather than shipments. It should be noted, however, that this method of adjustment took account only of inventories of finished goods, and not of inventories of goods in process.

For the other 20 industries which were adjusted for inventory changes the census data on the value of inventories of both finished goods and of goods-in-process formed the basis for the adjustment. Through the use mainly of wholesale price indexes, the value of inventories at the start and the finish of 1947 for each industry was converted to average 1947 prices, and the 1954 inventories to average 1954 prices. The change in inventories during 1947 was then added to the published 1947 figures for both value of shipments and value added and similar adjustments were made for 1954. The industry value figures thus referred to production and the industry index was on a production basis, even though the underlying product index may have been on a shipments basis.

Industry-product problem.--The use of detailed product data for construction of production indexes has obvious advantages for analytical purposes. It provides the basis for understanding changes in demand and supply, which aggregates for industries often conceal. At the same time the use of these data leads to certain conceptual limitations for the purpose of measuring changes in industry value added in constant prices.

There are two problems in this connection. One concerns the differences between the product and industry statistics. The other concerns the relation between changes in gross value of output of products and changes in value added.

As noted earlier, the output changes shown by the product statistics are not necessarily representative of the output changes of the industries in which they are primary. To take an extreme example, output of household washing machines and other household laundry equipment (products primary to the domestic laundry equipment industry) increased about 29 percent from 1947 to 1954. Output of the washing machine *industry*, however, increased only 10 percent. The difference between the two figures reflects largely the fact that many more washing machines were produced as secondary products by establishments in other industries in 1954 than in 1947.

In the method used to obtain the production index for the domestic laundry equipment industry, a price index for washing machines wherever made was used to deflate the value change in output of all products of the washing machine industry. As shown in table 2, for SIC industry 3581, using "cross weights," the product index at 129 compares with the industry index of 110.

The above example is, of course, a simplification of the problems faced in the calculation of industry indexes from data for primary products. In many instances, secondary output was a more important consideration, and also the product mix of primary products wherever made differed from that in the industry.

In general, however, the indexes for individual industries are believed to be generally more accurate measures for the industries in question than the indexes based on primary products. This is not to say that the primary product indexes are not accurate in themselves. They are, indeed, more useful for many purposes than the industry indexes--but as product measures. For purposes of comparing industry output with other industry statistics such as the utilization of materials, fuels, electric power, and manpower, the industry indexes are believed to be preferable to the product measures.[4]

Approximations to value added in constant prices.--Another set of problems in the calculation of indexes for products and individual industries arose from the difference between gross value and value added. As measures of gross value in constant prices, the product and individual industry indexes are only approximations to measure of value added in constant prices. That is to say, these indexes are gross both as to weights and as to the measure of the 1947-54 change in production.

Value added data for products of an industry can only be estimated. They are not directly reported largely because of the difficulty of allocating to individual products the joint costs of materials, fuels, etc., consumed in producing several products. In the use of gross value weights for calculating the product indexes it was assumed, therefore, that such weights were reasonably good approximations of value added weights. This assumption is customary in this type of index calculation.

For several industries for which gross value weights for products were believed to be very poor approximations of value added proportions, value added weights were estimated. Industries were selected for such value added weights for products in part because of duplication within the industry of value of product. Included among such industries were sulfuric acid and inorganic chemicals not elsewhere classified, fertilizers, and steel. The procedure used for obtaining product and industry indexes in these cases was generally as follows:

1. Estimates of value added were made for each product class by multiplying its 1947 and 1954 value of shipments wherever made (i.e., shipments by all industries) by the 1954 ratio of value added to value of shipments for establishments specialized to a high degree in the production of that class.[5]

2. The separate class of product indexes were combined into an aggregate product index for the industry as a whole by means of the value added weights computed in step 1.

3. The final industry index was calculated by deflating the 1947-54 change in total industry value added by an index of value added per unit of output derived from the product index of step 2.

The industries whose product classes were treated in this fashion accounted for approximately 4 percent of total value added by manufacturing in 1954.

Apart from these refinements in product class weights the indexes at the group level and at the level of total manufactures are perhaps a closer approximation to a measure of value

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[4]For a diagrammatic illustration and detailed discussion of the industry-product problem, see Appendix D of Census of Manufactures: 1947, Indexes of Production.

[5]Based on table 8 of the 1954 Census of Manufactures, Volume II.

added in constant prices than the product and industry indexes. This is chiefly because value added weights are used to aggregate the industry indexes into groups and the total. In addition, the considerable industry detail used to obtain the group and total indexes (436 individual industry indexes) makes it possible to have separate measures for the various stages of manufacture. Thus separate indexes were constructed for industries making various materials such as steel, aluminum, lumber, textiles, flour, etc.--highly fabricated parts, such as motors and electronic tubes--and final products such as autos, appliances, furniture, apparel, and bakery products. The fact that these output indexes are separately calculated implies that allowances are made for different output changes among industries all along the line from materials to parts to finished goods.

Quality changes.--In some respects the most difficult problem in production measurement, conceptually and statistically, is the measurement of changes in quality. As is well known, individual products often treated as identical from one period to another tend to change in quality because of changes in functions, design, or other specifications. Moreover groups of products treated statistically as individual products may experience shifts in composition or "mix." Because such changes may have been large over a period of seven years, the detailed comparisons for the 6,000 products in the census often reflected changes in value which resulted from "quality" or compositional changes. "Quantity" changes in these senses are in fact "quality" changes which are concealed largely by the failure to provide complete detail.

The fact that the product indexes were calculated in considerable detail (e.g., passenger autos were separately classified by make, model, body style, and type of equipment) implies that the indexes do reflect certain changes in quality that occurred between 1947 and 1954. Moreover, the census unit value changes from 1947 to 1954 shown for the "Q" products described earlier were reviewed in part to detect such possible effects of changes in "product mix." Part of this review procedure consisted in comparing the changes in unit value for "Q" products with price changes shown by comparable items in the BLS wholesale price index. When large discrepancies were found further analysis was undertaken, and in a number of cases where quality changes or compositional changes were apparent, the WPI price relative was substituted for the unit value change. In these cases, instead of obtaining a quantity relative based on census quantity data, the census value of output was deflated by the WPI price index. Such changes generally but not always tended to raise the production indexes.

Price indexes, however, also reflect inadequate allowances for quality changes. Thus, for one important capital equipment item, steam-turbine generators of over 7,500 kilowatt capacity, unpublished census data were used to develop an index of dollars per kilowatt. Deflating shipments by this index indicated about 12 percent more growth in output than deflation by the most closely comparable item in the wholesale price index.

For such products as aircraft, heavy machinery, and military equipment, units of quantity were exceedingly difficult to define, apart from the problem of inadequate physical volume data. Estimates of output change are admittedly crude for these products. Much further investigation is needed of data and concepts for measuring changes in type, value, and meaning of product in this area.

Classification changes.--Two important changes were made in the scope of the 1954 Census of Manufactures which affected the comparability with 1947 data.

(1) In the 1954 Census, milk processing (pasteurizing, homogenizing, vitaminizing, bottling) was defined as a manufacturing activity. For the 1947 Census, in accordance with the 1945 edition of the Standard Industrial Classification, establishments shipping any fluid milk were excluded from manufacturing even if their primary activity was in manufacturing dairy products. In the 1954 Census establishments processing and distributing fluid milk and other dairy products were classified on the basis of the primary product or activity of the establishment.

(2) In the 1947 Census, logging camps and contractors (SIC 2411) were excluded from manufacturing but in the 1954 Census they were included.

Comparable data were obtained for the two years for the above two industries. (See chapter 6.)

Estimating Output of "Indirectly Represented" Industries

As described earlier the estimation of the output change for industries for which quantity data were not available was based on deflated value data. Such industries accounted for 14.4 percent of value added in 1954 and were concentrated mainly in the metal fabricating and miscellaneous manufacturing groups.

The value data used for these industries pertained to their gross value of output. The price indexes used to deflate these value data were mainly gross value per unit indexes implicit in the production index calculations for related "directly represented" industries.

Before deciding to use deflated value data other alternatives were considered. In the 1939-47 calculations, for example, output of "missing industries" within a major group was estimated on the assumption of similarity of change in output per man for these and represented industries in the group. This alternative was chosen for those calculations over the assumption of similarity of change in value added per unit mainly on the finding that there was relatively less dispersion for represented industries in output per man indexes than in indexes of value added per unit. Output per man rather than per man-hour indexes were used because of the lack of data on hours in the 1939 Census.

In the 1939-47 comparison price increases were very large and more varied than increase in output per man. In the 1947-54 comparison, however, the reverse was true, with output per

TABLE B.--COEFFICIENTS OF VARIATION FOR 1954 INDEXES OF GROSS VALUE PER UNIT AND OUTPUT PER MAN-HOUR, BY INDUSTRY GROUP

Code	Industry group	Coefficients of variation for industry indexes of	
		Gross value per unit	Output per man-hour
20	Food and kindred products.....	19.5	17.5
21	Tobacco manufactures.....	11.8	16.8
22	Textile mill products.....	18.5	23.6
23	Apparel and related products..	9.8	9.2
24	Lumber and wood products.....	13.6	20.6
25	Furniture and fixtures.....	20.1	36.0
26	Pulp, paper and products.....	9.3	13.1
27	Printing and publishing.....	10.2	32.8
28	Chemicals and products.....	24.9	24.7
29	Petroleum and coal products...	9.0	18.4
30	Rubber products.....	3.4	22.9
31	Leather and leather products..	11.3	9.6
32	Stone, clay, and glass products.....	7.6	15.5
33	Primary metal products.....	13.7	14.8
34	Fabricated metal products.....	9.6	15.0
35	Machinery, except electrical..	10.0	15.6
36	Electrical machinery.....	17.2	17.3
37	Transportation equipment.....	10.6	15.9
38	Instruments and related products.....	13.9	17.0
39	Miscellaneous manufactures....	13.3	16.1

Note: The deviations were computed from unweighted group means of "directly represented" industries. The industry indexes employed weights based on average unit valuations for 1947 and 1954.

man-hour increases larger and more varied than price increases.

As table B shows, coefficients of variation in 1947-54 indexes of gross value per unit were smaller than for output per man-hour in most groups of manufactures, and particularly in the groups where the "indirectly represented" industries were important. Coefficients of variation for value added per unit, not shown in the table, tended to be in between those for gross value per unit and output per man-hour.

Coefficients shown in the table, though smaller for gross value per unit, were still large and broad margins of error are likely in the estimates of output for "indirectly represented" industries.

To minimize this error an effort was made to be "selective" in the choice of price deflators. For industries accounting for about half of value added in the "indirectly represented" category, price deflators were based on gross value per unit indexes for "directly represented" indexes of the respective major group. For the other half selected deflators were used, partly from industry price indexes developed by BLS in their input-output calculations and partly by use of implicit deflators from related "directly represented" industries.

CHAPTER 4. EFFECTS OF THE WEIGHT YEAR ON INDEX RESULTS

The use of different weight periods in calculating production indexes may yield significantly different measures of growth in average output. As shown in table 2 of chapter 2 the increase in total manufacturing production from 1947 to 1954 was calculated at 31 percent with 1947 weights and 26 percent with 1954 weights. One measure implies a growth rate over the seven-year span of 3.9 percent per year and the other 3.3 percent--both rates being depressed by the fact that 1954 was a year of recession while 1947 was a year of expanded activity. In the calculations for the census years 1939 and 1947 differences due to weights were also noted which showed a rise of 84 percent with 1939 unit values and 69 percent with 1947 unit values.

The effect of weights on production index calculations arises from variation among products and industries in price and output changes. If all series showed the same percentage output change, it would not matter what weights were used; the aggregate index would show the same change as each of the series. Similarly, if all prices changed proportionately the aggregate index would be unaffected by the choice of weight year. But when both production and price changes vary widely, as they did from 1947 to 1954, the choice of the weight year may have an appreciable effect on the index results.

Over the seven years spanned by the indexes in this volume, major factors influencing price and production changes included (a) readjustments to peacetime output after World War II, (b) the economic recessions of 1948-49 and 1953-54, (c) the Korean War from mid-1950 to mid-1953 with the accompanying enlargement of the nation's defense program, and (d) an overall economic growth trend associated in part with new products and processes.

In many index calculations, as in the present one, the use of an earlier weight year has yielded a higher index than use of a later weight year. This result is usually attributed to an inverse relation between price and production changes. Thus, if industries are grouped into those with higher than average output indexes on the one hand and lower than average indexes on the other, then the first group would be characterized by lower than average price indexes and the second by higher than average price indexes. This pattern is evident to some degree in the present calculations. The problem, however, is a complex one--and an adequate understanding of the effects of using different weight periods requires more detailed examination.

In general it appears that in the majority of industries the 1947-54 estimated production and price changes were such as *not* to lead to important differences in a total index for manufactures using different weight periods. The changes in a number of industries, however, did contribute appreciably to a higher 1947 weighted index, more than offsetting the smaller number of industries tending to bring about a lower one. Such varying situations, largely implying a complex interplay of demand and cost influences, may be understood more clearly if the effect of weights within industries is considered separately from that among industries.

Weight Effect Within Industries

In the standard procedure followed in the present calculations industry indexes were based on aggregates of indexes for primary products.[6] In many cases the industry indexes are higher when the component product indexes are combined with 1947 weights than when 1954 weights are used, as shown in table C. A large proportion of these are in the chemicals and metal fabricating industries. In a relatively few cases the 1954 weighted indexes are higher. For a large number of industries, as table C shows, the differences are small.

TABLE C.--DISTRIBUTION OF RATIOS OF 1947 WEIGHTED INDEXES TO 1954 WEIGHTED INDEXES

(1954 Indexes, 1947 = 100)

Ratio	Industry indexes		
	Number	Percent distribution	
		Number	Proportions in 1947[1]
Total.....	436	100.00	100.00
Under .900.....	1	0.23	0.05
.900 to .924.....	2	.46	1.27
.925 to .949.....	7	1.61	.63
.950 to .974.....	11	2.52	3.21
.975 to .999.....	72	16.51	16.82
1.000 to 1.024.....	199	45.65	46.59
1.025 to 1.049.....	73	16.74	17.97
1.050 to 1.074.....	30	6.88	4.98
1.075 to 1.099.....	12	2.75	2.52
1.100 to 1.124.....	7	1.61	.89
1.125 to 1.149.....	6	1.38	1.90
1.150 to 1.174.....	4	.92	1.61
1.175 to 1.199.....	4	.92	.29
1.200 and over.....	8	1.83	1.27

[1]Based on unit values in 1954 and 1947.

Note.--Ratios under 1.00, equal to 1.00, and above 1.00 signify respectively that the 1947 weighted index for an industry was less than, equal to, or more than the corresponding index with 1954 weights. The number of industries shown in this table include both "directly represented" industries and those "indirectly represented." See chapter 3. For approximately 45 industries a unity ratio was necessarily obtained because a single price index was used to deflate the change in value of output or because the production index was based on one product only.

An example in which the 1947 weighted index was higher than the 1954 one was in the steam engines and turbines industry (SIC 3511). An important product of this industry is the large steam turbine generator--a basic item of equipment for the rapidly growing electric utility industry. Output of the large generators (capacity rating of 7,500 KW and over) increased far more and prices rose much less than for other equipment made in the industry. As a result, the weight for large turbines and generators was higher with 1947 valuations than with 1954 valuations--thus contributing to a higher 1947 weighted total index for this industry. As shown in table 2 of chapter 2, the industry index is 226 with 1947 weights and 191 with 1954 weights.

Another interesting example of a higher base year weighted index compared to one with 1954 weights was in the radios and related products industry. The higher base year weighted index stemmed largely from the fact that (a) home radio set

[6]See Chapter 3 for discussion of the adjustment of product indexes to obtain industry indexes.

output fell while television set output rose very sharply, and (b) radio prices showed little change while television prices declined markedly.[7] Shifts in demand and declines in costs were reflected in the significant weight changes within the industry. As a result, television output raised the average output of the industry more with base year than with current year weights. In some of the chemicals industries, divergent price and output changes of products within industries similarly gave rise to significantly higher 1947 weighted indexes. The indexes in table 2 of chapter 2 for 2823, Plastics materials; 2841, Soap; 2842, Cleaning products; and 2897, Insecticides, displayed especially large differences due to weights.

Weight Effect Among Industries

When production indexes for industries are aggregated into group indexes and into an index for all manufacturing, the different results obtained with 1947 weights compared to 1954 weights depend on variation in production and price behavior among industries as well as between the products in an individual industry. An indication of the nature of this variation among industries is shown in the following scatter chart which shows 86 industry indexes accounting for about one-half of total value added in 1954. The quadrants of the chart divide the selected industry indexes into the following groups: those with higher or lower than average output changes (indexes higher or lower than 128)—and for each of these indexes those with higher or lower than average price changes (value added per unit indexes above or below 117).

As the chart shows, quite a few of the industries tend to cluster around the average either for price or output change and some are near both. Those in the upper left and lower right quadrants, however, tend to predominate over those clearly in the other two quadrants. This signifies that an inverse relation between output and price changes has tended to outweigh a positive relation, especially considering the location of the points within the quadrants.

Among the industries which experienced more than average expansion in output, a substantial majority experienced lower than average price increases, reflecting in many cases cost-reducing technological advances and economies of scale as price reductions permitted greater sales. As shown in table 2, 1954 price weights were smaller than 1947 price weights for such relatively expanding industries as 2037, Frozen Fruits and Vegetables; 2093, Margarine; 2234, Synthetic Fabrics; 2369, Children's Outerwear; 2432, Plywood Plants; 2514, Metal Furniture; 2825, Synthetic Fibers; 2829, Miscellaneous Organic Chemicals; 2871-2, Fertilizers; 3585, Refrigeration Machinery; 3661, Radios and Related Products; and 3722, 3, 9, Aircraft Engines and Equipment. The production-price points for these industries fall in the lower right hand quadrant of the scatter chart.

For some expanding industries 1954 price weights were larger than 1947 price weights. These include 2812, Alkalies and Chlorine; 3334, Aluminum; 3511, Steam Engines and Turbines; 3541, Machine Tools; and 3861, Photographic Equipment. The points for these industries fall in the upper right hand quadrant of the scatter chart.

Among the industries experiencing a smaller than average increase in output from 1947 to 1954 was the steel industry. (3312, 3393 and 3399 combined). This industry contributed substantially to a lower 1954 weighted index for all manufacturing. The rise in steel output from 1947 to 1954 was considerably less than the rise for all manufacturing but the price rise was well above average. Hence the production-price relationship for this industry is found well up in the upper left hand quadrant of the scatter chart.

Steel prices, which had risen more than prices of other manufactures after 1947, were maintained during 1954. Moreover, prices of materials used by the steel industry generally rose much less from 1947 to 1954 than prices of steel mill products. Prices of steel scrap, in particular, fell sharply in the 1953-54 recession, accompanying the marked drop in demand for steel. The larger increase in finished steel prices than in prices of materials used by the steel industry was reflected in a larger rise in value added per unit from 1947 to 1954 than in the gross value of shipments per unit. The higher 1954 weight for the steel industry stemming from the relative increase in value added per unit is shown in table 2 which indicates a proportion of 3.68 percent of total manufactures in 1947 prices and 5.25 percent in 1954 prices.

The significance of this example for the problem of changing weights also relates in part to the marked cyclical character of the steel industry. The fact that 1954 was a recession year—especially for steel—contributed to the higher "base year" (or lower "given year") weighted production index. If 1955 instead of 1954 had been used as the "current year" in the index calculation for both weights and series, it is probable that the steel industry might have contributed to a higher current year weighted index. This is because the increases from 1947 to 1955 of *both* prices and production of steel were apparently above the average for all manufactures. The big dot for the steel industry in that case would appear in the upper right rather than upper left quadrant on the chart.

An interesting case of an industry whose production index was below average and which contributed to a higher index with 1954 weights is the butter industry. Both the output and price indexes for this industry were below average, reflecting the competition of margarine. As shown in table 2, the weight for the butter industry was .14 percent in 1954 prices and .18 percent in 1947 prices. The dot for this industry appears in the lower left quadrant of the scatter chart.

The weights for major groups of industries shown in table 2 are summarized in the right hand portion of table D. Weights represent proportions of total value added by manufacturing in the year 1947, and are shown in the prices of that year, of 1954, and in the average of the two years. All three sets of weights total 100, of course.

For the food group, for example, 1947 value added in 1947 prices amounted to $10,534 million; for all manufacturing value added amounted to $77,219 million. In 1947 prices, then, the food group accounted for 13.64 percent of total manufactures, which is the 1947 proportion shown in the table. In 1954 prices, value added in 1947 by the food group is calculated $12,552 million or 13.54 percent of $92,698 million for all manufacturing. The value added figure for 1947 in 1954 prices for each group is obtained by dividing value added for the year 1954 for each industry in the group by its corresponding production index with 1954 weights, and summing the resulting values to a group total.

The "cross weights" in the table were obtained by summing value added for 1947 in 1954 prices with that in 1947 prices for each group and dividing this sum by the corresponding sum for all manufactures.

The largest relative change in weights at the major group level shown in table D is in the textile mill products group. Reflecting a much smaller than average increase in prices from 1947 to 1954, the weight in 1954 prices (4.97 percent) is much below that in 1947 prices (6.88 percent). In the apparel group, as a consequence of similar market influences, a much lower weight in 1954 prices than in 1947 prices is also evident.

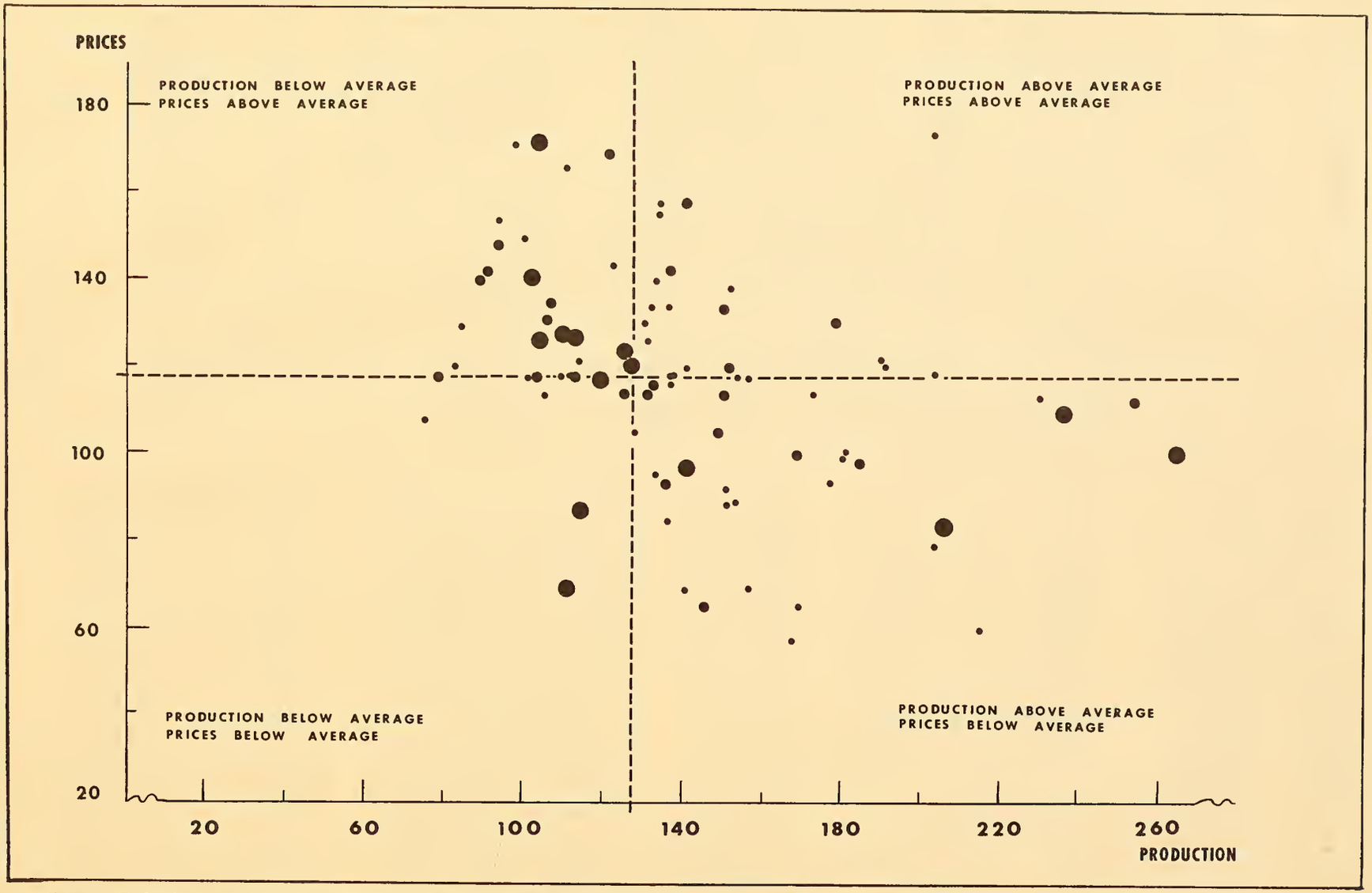
One of the most striking changes in weights is for the primary metals group, which in 1947 prices accounted for 7.42 percent of total manufactures and in 1954 prices accounted for 9.85 percent. This change resulted largely from a marked increase in relative prices for the steel industry as has been discussed above.

[7] See Chapter 6 for notes on calculations for this industry.

Chart 2

PRICES VERSUS PRODUCTION: 1954

INDUSTRY INDEXES, 1947 = 100



Note.--Industry production indexes are with cross weights, price indexes are value added per unit indexes and are approximations to those with cross weights. See page 29 for discussion of value added per unit price indexes. If 1954 weights or 1947 weights were used for production and value added per unit indexes, the configuration of industries would be changed only very slightly. The industries in the chart number 87 and represent about half of total value added by manufacturing in 1954.

LEGEND

- UNDER $500 MILLION VALUE ADDED IN 1954
- $500 AND UNDER $1,000 MILLION
- $1,000 MILLION AND OVER

TABLE D.--INDEXES AND WEIGHTS FOR MAJOR GROUPS AND TOTAL MANUFACTURES

(1947 = 100)

Code	Industry group	Production indexes based on--			Proportion in 1947 based on unit values in--		
		Cross weights	1954 weights	1947 weights	1954 and 1947	1954	1947
	All manufacturing industries	128	126	131	100.00	100.00	100.00
19	Ordnance and accessories	1,704	1,704	1,704	.11	.10	.11
20	Food and kindred products	109	108	109	13.59	13.54	13.64
21	Tobacco manufactures	108	107	109	.92	1.00	.83
22	Textile mill products	105	103	107	5.84	4.97	6.88
23	Apparel and related products	112	112	113	5.44	4.97	6.00
24	Lumber and wood products	112	111	113	3.42	3.08	3.83
25	Furniture and fixtures	124	122	125	1.76	1.73	1.80
26	Pulp, paper and products	131	131	132	3.82	3.81	3.83
27	Printing and publishing	126	126	127	5.47	5.38	5.58
28	Chemicals and products	164	160	169	6.76	6.45	7.12
29	Petroleum and coal products	131	130	132	2.31	2.18	2.48
30	Rubber products	114	111	117	1.78	1.86	1.68
31	Leather and leather products	90	89	90	2.02	2.01	2.04
32	Stone, clay, and glass products	124	123	125	3.23	3.37	3.06
33	Primary metal products	103	103	104	8.75	9.85	7.42
34	Fabricated metal products	114	113	116	6.90	7.23	6.51
35	Machinery, except electrical	116	114	119	10.98	11.51	10.34
36	Electrical machinery	165	156	175	5.02	5.00	5.04
37	Transportation equipment	189	182	197	7.87	8.04	7.68
38	Instruments and related products	152	149	156	1.51	1.54	1.48
39	Miscellaneous manufactures	129	123	135	2.50	2.38	2.65

At this point, it should be noted that a change in weights for an industry results from a change in price (value added per unit) for the industry relative to the change in price (value added per unit) for all manufacturing.

This may be seen symbolically as follows:[8]

Let the 1947 weight for an industry be $\frac{P_{47}Q_{47}}{\Sigma P_{47}Q_{47}}$ in which $P_{47}Q_{47}$ represents value added in 1947 prices for an industry and $\Sigma P_{47}Q_{47}$ represents value added for all manufactures.

Similarly, let $\frac{P_{54}Q_{47}}{\Sigma P_{54}Q_{47}}$ be the weight for the same industry in 1954 prices.

The ratio of the weights for the two sets of prices, say 1954 price weights divided by 1947 price weights, would be as follows:

$$\frac{P_{54}Q_{47}}{\Sigma P_{54}Q_{47}} \div \frac{P_{47}Q_{47}}{\Sigma P_{47}Q_{47}}$$

This expression can be transposed into:

$$\frac{P_{54}Q_{47}}{P_{47}Q_{47}} \div \frac{\Sigma P_{54}Q_{47}}{\Sigma P_{47}Q_{47}}$$

which represents a value added per unit price index for the industry divided by a value added per unit price index for all manufactures each with 1947 weights.

The relation of the value added per unit index for an industry to that for all manufacturing is one basic aspect of the effect of changing weights on the index for all manufacturing. The other is the relation of the production index for an industry to that for all manufacturing.

[8]The "P's" and "Q's" in the symbolism are not directly calculated "prices" and "quantities" but are respectively "values added per unit of output" and "quanta of work done" for the industries in question.

Summary of Effects of Weights on Index Calculations

It is apparent from the above analysis that the higher total index with 1947 weights has resulted from several influences. Some of these are of a trend nature stemming from the growth of new industries such as those making television and certain chemicals, and probably reflecting the influence of costs on prices. Some reflect cyclical forces as in the case of steel, reflecting demand factors and perhaps factors related to the structure of this type of industry. Some influences worked in the direction of a higher 1954 weighted index as in the cases of the expanding aluminum industry and the declining butter industry.

As between the weight effect within industries and among industries the former has apparently been somewhat more important. This conclusion is based on the following: First, the total difference between a 1947 and a 1954 weighted index for all manufactures was 5 points (i.e. the difference between 131, based on 1947 weights and 126, based on 1954 weights). Second, the difference resulting from weights among industries was 2 points. This was obtained as a difference between the all manufacturing index with 1954 weights, and that obtained by taking industry indexes each based on 1954 weights for products and combining them with 1947 weights for industries. An almost identical result was obtained from the difference between the all manufacturing index with 1947 weights and that using industry indexes each with 1947 product weights and combined with 1954 industry weights. The total difference (5 points) less the "among industry" difference (2 points) equals the "within industry" difference (3 points).[9]

Inasmuch as weights for combining product indexes are based on gross values rather than value added, a possibility exists that changes in value added for products would not show the same changes in relation to output as gross value changes. Moreover, the weights assigned to products on a value added basis might differ from gross value weights. Where important

[9]The identical "within industry" difference could also have been obtained by comparing an all manufacturing index with 1947 product and industry weights with that based on 1954 product and 1947 industry weights, or by comparing an all manufacturing index with 1954 product and industry weights with that based on 1947 product and 1954 industry weights.

differences between gross values and value added were expected to arise, however, value added weights were estimated for different product groups as noted in Chapter 3.

The complexity of these influences suggests certain cautions in the interpretation and application of weight periods for production measurement. The case of the steel industry, shows that the weight difference was in part due to special characteristics of the two years in question (i.e., 1947 was in a high phase and 1954 was in a low phase of cyclical fluctuations) and therefore should not necessarily be taken as a general tendency of index numbers. Second, the fact that the index comparison was over a long period (7 years) probably gives greater influence to cost factors (and their effects on prices and volume of sales) rather than to demand factors and so tends to provide the basis for an inverse relation of prices and output for the faster growing industries. Over a shorter period, demand factors might be more important.

The above analysis suggests the many difficulties associated with the problem of choosing a "proper" set of weights. It has been noted, for example, that 1947 weights for television were inappropriate even as a base year price.[10] Even the 1950 price for TV was soon outdated. The 1954 price for steel (on a value added per unit basis) had serious limitations because 1954 was a recession year. Selectivity in choice of weights, involving different weight years for certain series, is a difficult task. When changes are of an extraordinary character for both output and prices, however, or when single year weights from census data relate to different phases of business swings, serious consideration to such matters may be required. For certain purposes it may be desirable to use a uniform weight structure of a given period on an across-the-board basis to reflect the economic and technological conditions of that period.

Thus it is apparent that the most recent year may not necessarily be the "best" year for weight determinations. This consideration is especially relevant in connection with weights developed for monthly indexes. The use of different weights may not only change the general level of an index for benchmark and other years but also affect the timing and amplitude of fluctuations in indexes of business activity. The steel example is again particularly pertinent because of the highly fluctuating character of this industry.

A further aspect is suggested in the above calculations. That is the fact that the index calculations were carried on in considerable detail involving separate indexes for several thousand products and for 436 industries. The influence of weights is reflected more fully as the detail in which the indexes are calculated is increased. In addition errors in the data, partly related to the detailed levels of the calculation, magnify the tendency toward a higher base year weighted index. This is discussed in the following technical note.

Technical Note to Chapter 4[11]

As has been noted above, the effect of weights on production index calculations arises from variation in relative prices and outputs. To summarize the matter briefly, combinations of high price indexes and low output indexes (high and low relative to the total indexes) or of low price indexes and high output indexes tend to make an aggregate index with current-year weights lower than one with base-year weights. Combinations of high price indexes and high output indexes or of low price indexes and low output indexes tend to make an aggregate index with current-year weights higher than one with base-year weights.

The purpose of this note is to point out that apart from any of the economic changes measured by the price and output indexes in this volume, there are certain technical factors reflected in the indexes which make them tend toward the first kind of situation, namely a correspondence of high price indexes and low output indexes or of low price indexes and high output indexes. These technical factors, it is felt, might be responsible for a significant share of the difference between the all manufacturing index of 131 derived with base-year weights and the index of 126 derived with current-year weights. Furthermore, the factors are present in many other index calculations made with alternative weights, both for the United States and for other countries. There is a possiblity, therefore, that they may help to explain differences due to weights in a wide range of output and price measures.

The first of these factors is the approximate character of the price and output indexes. Lack of quantity and price information for many products and industries, partially estimated information for other products, and quality changes within many of the remaining products all contribute to overstatements or understatements in individual indexes. The census indexes are, of course, far more accurate than indexes based on less comprehensive monthly and annual data, but it is in the nature of output and price measures that they only approximate changes in real value and in dollars per real unit.

The second of these factors is the interdependence of the output and price indexes. For each product treated separately in the index calculation, either a price index was estimated and the output change derived (in effect by dividing the value change by the price change), or an output index was estimated and the price change derived (by dividing the value change by the output change). If the output change was overstated for a particular product, then the price change was understated; if the output change was understated, the price change was overstated. Similarly, for industry indexes, output was estimated first and value added per unit derived by dividing the value added change by the output index. If an industry output index was understated, there was a corresponding overstatement in its value added per unit index. Given census dollar value figures for two years, in other words, each estimate of a price change between the two years implies an estimate of an output change, and each estimate of an output change implies an estimate of a price change.

Now when they are taken together, these two factors—the approximate character of the indexes, and the interdependence of price and output indexes—exert an influence on the weight difference between alternative aggregate output or price measures. To understand this influence, it is helpful to think of each output index as consisting of a "true" output measure and an error term, positive or negative (of course, it is not possible to make a statistical separation of actual indexes into these two components). Each corresponding price index will then also consist of a "true" price measure and an error term; and because of the interdependence of output and price indexes, each positive error term in an output index will correspond to a negative error term in a price index, while each negative error term in an output index will correspond to a positive error term in a price index. There is, then, an inverse relation between the error terms in each output and price index. This inverse relation of error terms contributes to a negative correlation of actual price and output indexes—to a correspondence, in other words, of high output indexes and low price indexes, or of low output indexes and high price indexes. And it is this kind of situation, as noted above, which makes a current-year weighted aggregate index lower than a base-year weighted aggregate index.

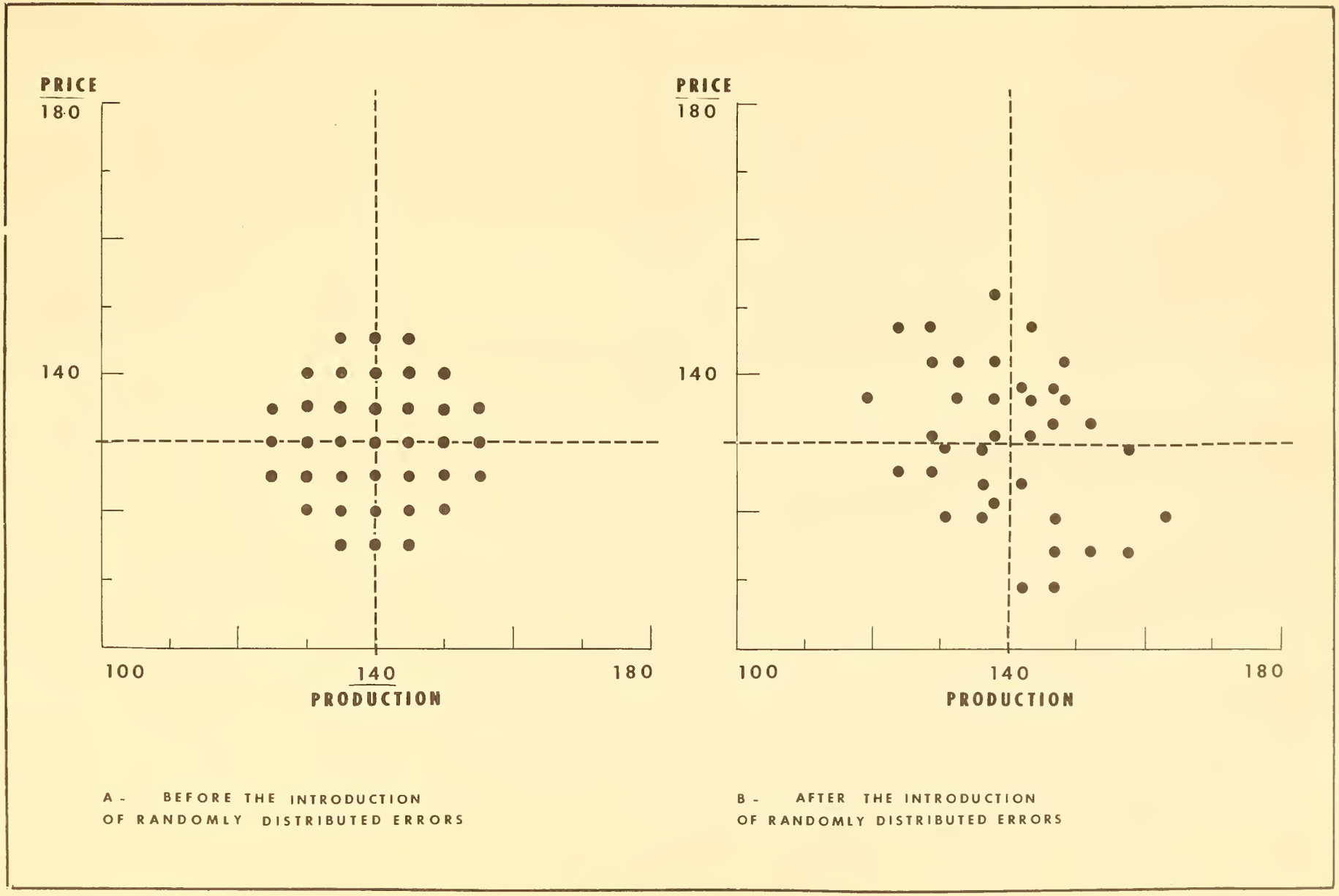
[10] See Chapter 6.

[11] This note was written by Frank de Leeuw of the Board of Governors of the Federal Reserve System.

Chart 3

HYPOTHETICAL INDUSTRY

PRICE AND PRODUCTION INDEXES FOR INDIVIDUAL PRODUCTS



A - BEFORE THE INTRODUCTION OF RANDOMLY DISTRIBUTED ERRORS

B - AFTER THE INTRODUCTION OF RANDOMLY DISTRIBUTED ERRORS

The hypothetical example in the accompanying chart illustrates these remarks. The points on the left panel of the chart represent "true" output and price indexes for the products of an imaginary industry, with all products approximately equal in importance in the base period. There is no correlation in the left panel between the output and the price indexes. The right panel of the chart represents a transformation of the left panel, derived as follows: for half of the points in the left panel, selected at random, an upward bias of 5 percent was introduced into each output index and a consequent downward bias into each price index. For the other half of the points, an upward bias of 5 percent was introduced into each price index, and a consequent downward bias into each output index. Each point was accordingly moved up and to the left, or down and to the right. In total, the error terms introduced into the right panel of the chart are largely offsetting; but there is nevertheless a clear, though moderate, tendency for high output indexes to correspond to low price indexes, and low output indexes to high price indexes. Thus, overstatements and understatements in individual product indexes, even if these errors are to a large extent offsetting at the total level, tend to increase a base-year weighted industry index relative to a current-year weighted industry index. The same comments apply, of course, to the relation of individual industry indexes to indexes for industry groups and larger aggregates.

The illustrative chart also suggests some other features of the relationship between weight differences and errors in individual indexes. The first of these is that the larger the errors relative to the dispersion of the individual indexes, the greater the effect on the weight difference for the total index. If the error terms introduced in the chart had been very small relative to the average distance between adjacent points, then the right panel of the chart would have been almost identical with the left panel. The 5 percent errors shown produced some negative correlation in the right panel; 10 percent errors would have produced a stronger negative correlation.

A second feature suggested by the chart is that the magnitude and even the direction of the effect of errors on weight differences depends on the precise distribution of errors. With errors distributed at random, the chances are overwhelming that the effect will be to raise a base-year weighted aggregate relative to a current-year weighted aggregate. If errors are systematically related to growth rates and price movements, however, the effect is more complicated. Errors concentrated among products with average output and price changes, for example, would have much less effect on weight differences than randomly distributed errors. If errors consisted mainly of understatements of fast-growing products with low price indexes, it is possible that their effect would be to lower a base-year weighted aggregate relative to a current-year weighted aggregate. Some other types of error would work in the same direction as randomly distributed errors, but with greater intensity.

There remains the question of how important these technical influences were in the actual Census calculation. No simple answer is possible, since the "error terms" in specific product and industry indexes are of course of unknown size. However, consideration of the industries which contributed heavily to the weight difference gives an impression of some of the forces at work. On the one hand, these industries produced more than their share of "growth" products with high output and low price indexes--products such as television sets, frozen foods, synthetic detergents, antibiotics, ballpoint pens, insecticides, plastics materials, aircraft engines, and computing machines. These products suggest technological advances as one important source of the weight difference. On the other hand, these industries also produced many heavy equipment items with low output indexes for 1954 and with high estimated unit value indexes--items such as farm machinery, X-Ray apparatus, mechanical stokers, printing machines, dry-cleaning machines, and a wide variety of other special-industry equipment. To the extent that the problem of measuring quality change is especially critical for this type of product, this second list suggests that errors in individual indexes were another important factor contributing to a lower current year weighted index.

CHAPTER 5. RELATION TO OTHER BASIC STATISTICS

The nature of the indexes of manufacturing production presented in this volume may be clarified if they are viewed in relation to certain other measures of economic activity. Considering first the measures for the whole economy, the index of manufacturing production may be viewed in relation to gross national product and to national income. In these frameworks the value of output contributed by manufacturing to total activity amounts to approximately 30 percent.

Relation to Gross National Product Statistics

Gross national product (GNP) statistics as presently prepared by the U. S. Department of Commerce represent estimates of the total value of economic output measured from the standpoint of consumption or expenditures. GNP is an aggregation of expenditures for final goods and services by consumers, business, and government. Two other items are added to obtain a total equal to total production, namely, the value of the change in business inventories, and the balance of exports less imports. Gross national product statistics are prepared in current and in constant prices. The constant price or deflated value data are relevant here for comparison with the index for manufacturing production.

In the index for manufacturing, the classification of series is essentially by industry, and in GNP by commodity. In GNP, the values used for each commodity are the final sales prices which embody all values arising in producing and marketing a commodity for final sale. Thus any comparison between manufacturing output and expenditures on manufactured goods in the GNP accounts is affected by the contribution to GNP of all other sectors of the economy besides manufacturing.

Attempts have been made in the United States and in various other countries to develop estimates of gross national product on an industrial classification basis. In this framework the contribution of each industry can be shown in terms of net value added to total national product. A value added framework is, in fact, used by the Department of Commerce in its "commodity flow" method of estimating for GNP the final value for most finished commodities at Census benchmark intervals. In this method, estimates are made for a benchmark year of value added to the factory value of a commodity mainly by the transportation and wholesale and retail trade industries. Also included are additions for excise and sales taxes and adjustments for foreign trade and inventory changes. In measuring changes over time the deflated GNP method essentially involves extrapolating from the benchmark year the indicated changes in values of final products in constant prices.

Census value added excludes from the factory value of products (usually products shipped) the cost of materials, supplies, containers, purchased fuel and electrical energy, and the costs of contract work. Value added, however, does not exclude certain other costs incurred in the purchase of services by one business from another, and thus is somewhat of an overstatement of the contribution of manufacturing to the final value of product. These services include advertising, insurance, purchased research and advisory services, and other professional services purchased by manufacturing establishments. Value added also does not necessarily take account of inventory changes, but some allowances were made in the index calculations for inventory changes at manufacturing establishments of both goods in process and of finished goods. Excise taxes are excluded from Census value added but not from GNP. Both census value added and GNP are gross in that depreciation and other capital consumption are included.

It is estimated roughly that the cost to manufacturing of services purchased, almost entirely from nonmanufacturing business establishments, amounts to about one tenth of total census value added. This cost is of varying importance among manufacturing industries, however. Hence, a more nearly net figure for each manufacturing industry would yield different value added weights. It is believed that the chief effect of deriving a more net figure of value added would be to reduce the relative importance of the food group. As a result, the increase in total manufacturing output from 1947 to 1954 would be slightly larger than indicated in this volume because the food industries showed less increase in output than the average for all manufacturing and, with a reduced weight, the effect of this in lowering the average would be correspondingly reduced.

Many of the items of purchased services that must be deducted from value added to arrive at a true net figure cannot easily be reported on an establishment basis. A supplementary inquiry is being undertaken by the Census Bureau, however, as part of the 1957 Annual Survey of Manufactures to obtain information on costs for such items as purchased maintenance and repair services, rental payments, and insurance for the year 1957.

The change in manufacturing production from 1947 to 1954, as calculated for this report, is an estimate of the change in value added in constant prices. Value added for an industry in 1947 is multiplied by an index, representing the 1947-54 change in constant prices in gross value of output. As such, the measure of change is on a more gross basis than GNP where output of activities prior to final sale are "cancelled out."

For example, in calculating the production index for the steel industry, the basic series used for measuring output change are for tonnages of ingots and of various shapes, forms, and kinds of steel. The changes in output calculated from 1947 to 1954 for each type of steel are an approximation to changes in net output. This approximation involves the assumption that the aggregate physical volume of various inputs (chiefly steel scrap, iron ore, other materials, fuels, and electric power) used in making the particular types of steel change in the same proportion as the change in tonnage of the particular steel product.

The construction of product indexes which take into account changes in inputs in relation to changes in outputs, and thus represents "net output," has not been feasible to date. Net output indexes for industries and for total manufactures have been constructed, however, in the United States, Canada and in Ireland.[12]

Relation to National Income

The national income figures as estimated by the U. S. Department of Commerce are published on an industry of origin basis with separate figures for major groups of manufacturing industries, thus providing data directly related to the areas covered by the index calculations in this report. National income is an aggregate of the costs or incomes of the factors of production. In manufacturing, such costs in 1954 totaled an

[12] For the United States see "Trends in Output Per Man-hour and Man-hours Per Unit of Output—Manufacturing, 1939-53," BLS report 100, U. S. Department of Labor. For Canada see "Revised Index of Industrial Production 1935-51," D.B.S. Reference Paper No. 34, Dominion Bureau of Statistics, Ottawa, Canada. For Ireland, see "The Concept of the Net Volume of Output with Special Reference to Irish Data," by R. C. Geary, Journal of the Royal Statistical Society Vol. 107, 1944; and also "The Use of Census of Industrial Production Material for the Estimation of Productivity," by R. C. Geary and K. G. Forecast, Revue De L'Institut International De Statistique, Volume 23 No. 1/3.

estimated $91 billion, out of a total for all industries of $302 billion. In examining the relation between the index of manufactures and national income statistics two aspects are highlighted: first, differences between national income data and Census value added data, and second, the constant price feature of the index calculations as contrasted with the current price nature of the national income data.

Value added and national income data are difficult to compare because of basic differences in their method of derivation. Value added is obtained as a difference between value of output and value of consumption of materials, fuels, etc., as noted earlier. National income is obtained as a sum of employee compensation, profits, income of unincorporated enterprises, rent, and net interest.

In 1954, Census value added totaled $116.3 billion or 28 percent more than the corresponding national income figure, as shown in table E. Differences between value added and national income varied substantially by industry groups, with an especially large difference evident in the food group.

A full reconciliation of the two figures would require considerably further study to determine differences which reflect (a) the use of company data to derive the national income figures and establishment data to obtain value added figures; and (b) the more net aspect of national income involving mainly the deduction of capital consumption allowances and of outlays for services (noted above) purchased by manufacturing establishments from other sectors.

In the measure of changes over time, the index of manufacturing production measures changes in value added in constant prices whereas national income figures are shown in current dollars. As table E shows, this largely accounts for the higher index for national income—155 as against 128 for value added in constant prices; the index for value added in current prices is 151. The difference between the change in value added in constant prices and of national income in current prices reflects changes in factor prices and productivities as well as other differences mentioned above between the two sets of data.

TABLE E.--NATIONAL INCOME AND VALUE ADDED IN MANUFACTURING INDUSTRIES

Total manufacturing	Billions of dollars		Index
	1954	1947	(1947 = 100)
Current prices:			
National income.....	91.1	58.7	155
Value added.....	116.3	77.2	151
Constant prices:			
Value added.....	108.7	85.0	128

Source: National income: Office of Business Economics, U. S. Department of Commerce. Value added: U. S. Bureau of the Census. Adjustments of census value added figures were made in the index calculations for inventory change and for undercoverage in 1947, see chapters 2 and 3. Constant price figures are based on average of prices for 1954 and 1947.

Statistics Dealing Directly With Manufacturing

A number of measures of economic change for the manufacturing sector are related in various ways to the index of manufacturing production. Such measures include: The Federal Reserve Board's indexes of industrial production; the various annual measures for manufactures developed by the BLS in connection with their studies of productivity changes; and the segments of the Wholesale Price Indexes of the Bureau of Labor Statistics which relate to factory prices for manufactured goods. A brief view of relations between these various measures and the Census of Manufactures indexes will make clear some of the special aspects involved in their construction and interpretation.

Federal Reserve index of industrial production.—The Census index is quite similar in concept to the Federal Reserve Board index of industrial production. While the Federal Reserve index includes mining as well as manufacturing, the manufacturing segment accounts for about nine-tenths of the total index. This segment as well as the underlying indexes for industry groups and individual industries and certain component product series and their weights will be reviewed in the light of the indexes shown in this report. In addition certain product indexes such as those for automobiles, furniture, carpets, washing machines, refrigerators, various small appliances, and other consumer durable goods will also be used for reviewing the Board's special index for consumer durable goods output.[13]

BLS productivity indexes for manufacturing.--The BLS in connection with its productivity studies has developed various annual indexes of output per man-hour and per worker for manufacturing industries. Two general categories of productivity measures are published by the BLS. First, there are the indexes of physical output per man-hour which show the change in labor time required to produce a fixed composite of goods and services. Second, there are the net output per man-hour measures which reflect in addition to changes in physical output per man-hour of component indexes, shifts in the relative importance of industries with different levels of output per man-hour as well as changes in labor requirements due to changes in material consumed per unit of output.

The physical productivity measures for manufacturing are derived by combining individual industry indexes with man-hour weights. Production indexes used in the construction of these productivity indexes are broadly similar at the industry and product level to those developed in this report. This is largely the result of the lack of data on man-hours at the product level, thus requiring the BLS to make the operating assumption that product values are proportioned to product man-hours. As a result, the industry indexes usually consist of product indexes combined, as are the benchmark production measures, with gross values of product output. For a few industries, man-hour weights are used for individual products and for others value added weights are used. The industry indexes are, however, combined with industry man-hour as weights. These man-hour weights differ, of course, from value added weights used to combine the benchmark indexes. Where the BLS product index has value weights, the BLS adjusts the indexes (for all years) to the level indicated by the benchmark indexes (for the Census years). Where the BLS product indexes have man-hour or value added weights the BLS constructs its own benchmark indexes using these weights and Census production data.

The output measure used in the other set of indexes developed by the BLS, its net output per man-hour indexes, is based upon the deflation of gross value of output on the one hand and the total cost of materials, fuels, etc., consumed on the other. The difference between the two deflated aggregates yields an estimate of value added in constant prices. Consequently, these indexes are a closer approximation to the concept of value added in constant prices than the Census indexes. The method of subtraction, however, requires considerable accuracy in the underlying value and price data.[14]

Relation to the wholesale price indexes.--There are numerous unit value implications of fundamental importance involved in a constant price measure such as the index of manufactures. An elementary aspect of a production index calculation is that a change in the value of output of a commodity can be factored into a change in price multiplied by a change in quantity. In the calculation of the production indexes, such price-quantity aspects have somewhat differing connotations for individual

[13] For detailed discussion of concepts and methods underlying the FRB indexes for industrial production and for consumer durable goods output see Federal Reserve Bulletins for December 1953 and May 1954, respectively.

[14] For a detailed description of the BLS productivity indexes see "Trends in Output Per Man-Hour and Man-Hours Per Unit of Output—Manufacturing, 1939-53," B.L.S. Report No. 100.

products, for combinations of products (such as product classes), for individual industries, and for aggregates of industries including total manufactures.

Differences at the individual product level between relatives based on Census data for dollar value per unit of output and corresponding price relatives in BLS data consist mainly in the fact that an item priced in the WPI is usually more narrowly specified than one in the Census of Manufactures. The WPI also concentrates on a sample within a narrow range of products. The broader individual product definitions in the Census may reflect a heterogeneity of brands, specifications, locations, and other factors which may affect the change in average unit value of product. At the same time, the Census product values per unit also reflect changes of various sorts, such as special pricing arrangements between manufacturers and distributors, which may not be adequately measured by WPI series. Such influences may work in the same or in different directions and may be of different importance for different products. Thus, the average value ("unit values") of any particular product may well change differently from the WPI relative for that product.

In the case of product groupings (census 5-digit product classes), unit value indexes are conceptually the same as corresponding commodity groupings in the WPI. In both types of indexes the valuations attached to corresponding products in the base period are generally the received selling values, f.o.b. plant, after discounts and allowances, exclusive of freight charges and excise taxes, and net of interplant transfers. The implied price change in the census index for an aggregation of products represents a ratio of the change in value of output of these products divided by their production index. In the WPI the change from 1947 to 1954 is based for the most part on 1947 weights. Using the Census index, an analogous implied price index with 1947 weights would be obtained if the change in value of output were divided by a production index with 1954 price weights.[15]

[15]See Chapter 4 for further discussion of weights.

At the industry level, in the standard procedure described earlier for constructing a production index, the price index based on primary products is used to deflate the change in the industry's value of output. This price index is an index of "gross values per unit of output," and in most respects is analogous to a corresponding grouping of products in the WPI.

Another type of price index is also derivable at the industry level, namely value added per unit of output. This is obtainable as a ratio of the change from 1947 to 1954 in dollar value added to the change in physical volume of production. Inasmuch as the change in value added is divided by a production index based, at the industry level, on changes in gross physical volume, the price index so derived is not a "true" net price index. A "true" net price index would represent the change in the margin between a gross price index and input price index, where the input price index represents a composite of prices of materials, fuels, and services purchased from other industries. There is no counterpart in the WPI to a value added per unit index.

For both gross value per unit and value added per unit, indexes with three sets of weights are derivable from the production index calculations. These implied indexes are shown at the major group level in table F. Weights referred to in the column headings are "quantity" weights. The change in gross value of output or in value added may be factored into a price index with 1947 quantity weights times a production index with 1954 price weights, or into a price index with 1954 quantity weights times a production index with 1947 price weights. A cross weighted price index is more complex, however, and the special aspects of such an index are discussed in Chapter 3.

Differences shown in the table between the gross value per unit and value added per unit indexes are quite large for some groups. These differences may be due, in part, to differences in the change from 1947 to 1954 between prices of materials consumed and of finished products for the industries in question. For example, where value added per unit indexes are higher, prices of finished products rose more than prices of materials consumed, as in the case of food, tobacco, leather

TABLE F.--IMPLIED UNIT VALUE INDEXES IN THE PRODUCTION INDEX CALCULATIONS: 1954

(1947 = 100)

Code	Industry group	Gross value per unit			Value added per unit		
		Cross weights	1957 weights	1947 weights	Cross weights	1954 weights	1947 weights
	All manufacturing industries	115	114	117	117	115	120
20	Food and kindred products	103	102	104	118	117	119
21	Tobacco manufactures	119	118	120	143	142	144
22	Textile mill products	96	94	98	85	83	87
23	Apparel and related products	93	92	93	99	98	100
24	Lumber and wood products	106	104	108	96	95	97
25	Furniture and fixtures	111	109	112	114	113	115
26	Pulp, paper and products	117	116	118	119	118	120
27	Printing and publishing	119	118	119	115	115	116
28	Chemicals and products	99	97	102	106	104	109
29	Petroleum and coal products	131	131	130	105	104	106
30	Rubber products	121	119	124	129	126	133
31	Leather and leather products	100	99	100	117	117	118
32	Stone, clay, and glass products	130	129	131	131	130	132
33	Primary metal products	146	145	146	158	157	159
34	Fabricated metal products	132	131	134	131	129	133
35	Machinery, except electrical	128	126	131	130	128	134
36	Electrical machinery	110	107	117	111	107	119
37	Transportation equipment	132	129	136	120	116	126
38	Instruments and related products	117	115	119	122	119	125
39	Miscellaneous manufactures	102	99	107	102	98	108

Note: Data for ordnance and atomic energy manufactures are included in the value added per unit indexes but not in the gross value per unit indexes. At the all manufacturing level the value added per unit indexes, excluding ordnance and atomic energy, are identical to those shown in the table. For the chemical group (in which atomic energy is classified) the value added per unit indexes, excluding atomic energy are very slightly lower than shown in the table.

and primary metals industries. Where the gross value per unit indexes are higher, materials prices rose more than for finished goods, as in the textile and petroleum industries.

While the gross value per unit indexes are conceptually analogous to the WPI data at the product level, they are not at the industry group and all manufacturing level. At these levels, the gross value per unit indexes are classified on the basis of an industry grouping which usually include various secondary products. In the WPI, primary product aggregates are used.

From 1947 to 1954 the gross value per unit index with 1947 quantity weights rose by 17 percent compared to an increase of between 18 and 19 percent for a special grouping of price indexes for manufactured goods in the WPI. Differences at more detailed levels are larger, but mainly offsetting in the total. In part, also, similarity in change shown by the manufactured goods component of the WPI and the gross value per unit index stems from the use of the WPI indexes for deflation purposes, as noted in Chapters 3 and 6.

Other statistics for manufactures.--Among other measures dealing with the manufacturing sector the most pertinent relates to the data on manufacturers' sales presently compiled by the Bureau of the Census and the Office of Business Economics of the Department of Commerce. These data are compiled monthly in current dollars, relate to company rather than establishment data, and involve considerable duplication. Differences from 1947 to 1954 between these sales data for manufacturing, and the census index would reflect all of these considerations plus the fact that the shipment data used in the census index were adjusted where possible for changes in inventory--both finished goods and goods in process.

CHAPTER 6. NOTES ON PROBLEM INDUSTRIES

These notes deal with specific industry indexes in which important departures were made from standard procedures. Important departures include the use of non-census quantity data, the use of estimated value added weights for product classes within an industry, the use of materials consumption rather than production data, certain cases in which special price indexes were developed, and a few other special procedures. The standard procedures for calculating the output change from 1947 to 1954 and major departures have been discussed in Chapter 3.

19—Ordnance

The index for this industry was based on value added adjusted for inventory changes and deflated by a price index for certain ordnance items and materials.

2011—Meat Packing Plants, and 2013—Prepared Meats

Because of large differences among product classes in the ratio of value added by manufactures to value of shipments, the special method of combining product classes with value added weights was employed for this industry. Industry value added and value of shipments were adjusted for changes in inventories.

2023—Concentrated Milk

In place of the Census quantity figure for "Bulk evaporated and condensed milk" which contains substantial duplication, the sum of the following U. S. Department of Agriculture quantity figures were used for the product index: "Concentrated skim milk (animal feed)," "Bulk condensed milk (sweetened)," "Bulk condensed milk (unsweetened)," and "Condensed or evaporated buttermilk." The census unit value was used as the weight for these items.

2026—Fluid Milk, and 2027—Fluid Milk and Other Products

Since these industries were not covered by the 1947 Census of Manufactures, it was not possible to construct a product index from Census data. Instead, the industry index was constructed directly from data on nonfarm consumption of fluid milk outside of dairy products plants, which is approximately equivalent to milk consumed by these industries. For the purpose of weighting this index in the calculation of the major group (2-digit) index, a 1947 value added by manufacture estimate was made by (1) applying to the cost of milk consumed in 1947 (estimated as 1947 nonfarm milk consumption used in the index multiplied by the 1947 price received by producers for milk used for city distribution) the 1954 ratio of cost of milk to total cost of materials and (2) then multiplying this result by the 1954 ratio of value added to total cost of materials adjusted for the change in this ratio between 1947 and 1954 for other dairy products industries.

2033—Canned Fruits and Vegetables

The Census of Manufactures provides quantity and value detail, by size of container, for each type of fruit and vegetable. For certain of the sizes, the 1947 and 1954 figures were found to be lacking in comparability, and it, therefore, became necessary to adopt a special method of constructing the product index: (1) 1954 price indexes (both 1954 weighted and 1947 weighted indexes) were calculated for each kind of canned fruit and vegetable from the available comparable container size detail. (2) These price indexes were used to deflate the 1947-1954 change in total value of each fruit and vegetable. (3) The resulting series of individual output indexes were combined into the product index by means of value weights.

2063—Beet Sugar

U. S. Department of Agriculture quantity figures for "wet beet pulp" were used in the product index since quantities were not uniformly reported to the Census Bureau.

2084—Wines and Brandy

There were some serious problems in this industry regarding the comparability of Census data for 1947 and for 1954. Therefore, the product index was based on quantities of production of wines and related products as reported to the Internal Revenue Service, weighted by census unit values for 1954. No industry index was calculated.

2111—Cigarettes

The Census of Manufactures collects only total cigarette output. In view of the growing importance of "filter-tip" and "king-size" types, the Census cigarette total was distributed among filter-tips, king-size and regular size on the basis of estimates made by Mr. Harry M. Wootten, consultant on tobacco and related industries to *Printer's Ink*. The prices used for weighting these detailed items, likewise, were based on estimates supplied by Mr. Wootten.

2233—Cotton Broad-Woven Fabrics

Although quantity information was obtained in the 1947 Census for individual products, value figures were available only for broad classes of fabrics. This gap in basic data was filled by special 1947 price information obtained from the Division of Prices and Cost of Living of the U. S. Bureau of Labor Statistics which was used to break down these summary value figures to match the available quantity detail.

2253—Knit Outerwear Mills, and 2254—Knit Underwear Mills

The product index was based on shipments of primary products by the industry rather than shipments of these primary products by all industries. This method of calculation was considered desirable because of the fact that some of the products classified in the industry are also primary to other industries and, therefore, are produced to a great but varying extent in those industries.

2261—Finishing Textiles, Except Wool

A 1954-weighted product index only could be constructed for this industry since no value data were collected for individual products in 1947. An industry index could not be calculated because of a lack of comparability in the total value of shipments for 1947 and 1954.

2369—Children's Outerwear, N.E.C.

The product index was based on shipments of primary products by the industry rather than shipments of these primary products by all industries. This method of calculation was considered desirable because of the fact that some of the products classified in the industry are also primary to other industries and, therefore, are produced to a great but varying extent in those industries.

2411—Logging Camps and Contractors

This industry was not covered by the 1947 Census of Manufactures. A product index was constructed for it from data on lumber cut in the sawmill industry and pulpwood receipts by

pulp mills. The product index was used as an industry measure. Value added in 1947 was estimated by using the ratio of 1947 payrolls to 1954 payrolls as calculated from Bureau of Labor Statistics employment and earnings statistics for logging camps.

2711—Newspapers

Adequate quantity of production statistics are lacking, and, therefore, an index of the consumption of newsprint by newspaper establishments was used as the industry index. No product index was calculated.

2731—Books: Publishing and Printing

A 1954-weighted index only could be constructed for this industry since satisfactory value data were not available for individual products for 1947.

2732—Book Printing

Because of the lack of quantity data a product index could not be constructed. Instead, the industry index was calculated directly by deflating the change between 1947 and 1954 in the value of shipments of the industry by the implied price index for the Book Publishing Industry (Ind. 2731).

2741—Miscellaneous Publishing, 2751—Commercial Printing, 2761—Lithographing, 2771—Greeting Cards, 2781—Bookbinding, 2782—Blankbooks and Paper ruling, 2783—Loose-Leaf Binders and Devices, and 2789—Miscellaneous Bookbinding Work

Because of the lack of quantity data, a product index could not be constructed. Instead the industry index was calculated by deflating the change between 1947 and 1954 in the value of shipments of each industry by the Bureau of Labor Statistics index of the wholesale price of printing paper.

2811—Sulfuric Acid, and 2819—Inorganic Chemicals, N.E.C.

Because of large differences among product classes in the ratio of value added by manufacture to value of shipments, the special method of combining product class indexes with value added weights was employed for this industry.

For the government-owned, privately operated establishments in this industry, the change in output was estimated from cost and employment data, and combined with the rest of the industry's output on the basis of value added weights.

2821—Cyclic (Coal Tar) Crudes

Only summary value data were obtained for cyclic (coal tar) crudes in the Census of Manufactures. Detailed quantity and value statistics for these products collected by the U. S. Tariff Commission were used in constructing the index. These product figures represent approximate production by tar distillers, as distinguished from coke ovens.

2822—Intermediates, and Organic Colors, and 2829—Organic Chemicals, N.E.C.

Only summary value data are collected in the Census of Manufactures for intermediates, organic colors, and industrial organic chemicals, n.e.c. Detailed quantity and value statistics for these commodities collected by the U. S. Tariff Commission were used in constructing the indexes. However, a lack of comparability between the 1947 and 1954 Tariff data, owing to the inclusion of interplant transfers in the 1947 figures and the exclusion of such transfers from the 1954 figures, made it necessary to depart from the standard method of calculating the product indexes. Instead of calculating them directly from the available commodity data, the special method involved: (1) calculating product class price indexes for 1954 (both 1947-weighted and 1954-weighted indexes) from the Tariff detailed quantity and value data; (2) calculating product class output indexes by deflation of the 1947-54 change in census product class values on the basis of these price indexes; and (3) combining the results into a product index for each of the industries by means of value weights.

2824—Synthetic Rubber

Since the U. S. Tariff Commission obtains greater commodity detail for "Synthetic Rubber" than does the Census of Manufactures, the product index was based on four series published by that agency.

2841—Soap and Glycerin, and 2842—Cleaning and Polishing Products

The product index was based on shipments of primary products by the industry rather than shipments of these primary products by all industries. This method of calculation was considered desirable because of the fact that some of the products classified in the industry are also primary to other industries and, therefore, are produced to a great but varying extent in those industries.

2871—Fertilizers, and 2872—Fertilizers, Mixing Only

Because of large differences among product classes in the ratio of value added by manufacture to value of shipments, the special method of combining product-class indexes with value added weights was employed for this index.

2895—Carbon Black

U. S. Bureau of Mines figures for carbon black produced by the contact process and by the furnace process were substituted for the census carbon black total in calculating the product index.

2898—Salt

Since the Census of Manufactures provides data only for total salt production, four U. S. Bureau of Mines series for the output of evaporated salt, by method of recovery, were used to construct the product index.

2932—Byproduct Coke Ovens

In constructing the product index, U. S. Bureau of Mines data were used for several coke-oven byproducts for which the Census of Manufactures provides only value information.

3011—Tires and Inner Tubes

Because of the growing importance of tubeless tires, the census passenger car tire total was distributed between tubeless and regular tires on the basis of estimates made by the Business and Defense Services Administration of the U. S. Department of Commerce. The prices used for weighting this detail were also prepared by that agency.

3312—Steel Works and Rolling Mills, 3393—Welded and Heavy-Riveted Pipe and 3399—Primary Metal Industries, N.E.C.

The product indexes for these industries were based on production of seven classes of products (ingots, semifinished shapes and forms, and five classes of finished products), combined with value added weights. Value added weights were not, however, based on data for specialized establishments, since the bulk of production in this industry is carried on in integrated rather than specialized establishments. Instead, value added for each product class was estimated directly by subtracting the estimated value of its major inputs from the estimated value of its major outputs. These value added estimates were based partly on American Iron and Steel Institute data.

The product indexes for these industries were taken to represent industry output, since any attempt to adjust a product to an industry index would have involved the use of shipments data containing considerable duplication.

3331—Primary Copper

This index is based on the production of blister copper, sulfuric acid, and copper sulfate by copper smelters and the production of copper and other nonferrous metals by primary refineries of copper. Because of the extensive duplication of products and the varying proportion of smelter products originated outside the United States in this industry the outputs of smelters and of refineries were combined with value added weights.

Weights for blister copper, refined copper, copper sulfate, and sulfuric acid were based on census unit values. Production of blister and refined copper were based on total industry production including toll or contract work. Weights for other nonferrous metals were based on unit values as reported by the Bureau of Mines and quantities of base metals according to those reported as produced in the industry, and of precious metals according to their content in copper ore.

3332—Primary Lead

This index is based on the industry production of refined lead, lead base alloys including that produced on toll or contract, and precious metals according to their content in the lead ore. The quantities and unit values of lead base alloys are based on those reported in the 1954 Census of Manufactures, Volume II, and of precious metals on those reported in the *Minerals Yearbook* of the Bureau of Mines.

3333—Primary Zinc

This index is based on the industry production of refined zinc, cadmium made in zinc plants, sulfuric acid made from zinc blende and precious metals derived from zinc ore. The production of refined zinc is based on census data. Data for other products are based on those reported in the *Minerals Yearbook* of the Bureau of Mines. Weights are based on census unit values for zinc and for sulfuric acid. Other product weights are based on unit values shown in the *Minerals Yearbook* of the Bureau of Mines.

3339—Primary Nonferrous Metals, N.E.C.

Quantity and value data are based on those shown in the *Minerals Yearbook* of the Bureau of Mines and insofar as possible contain industry production only. Weights are based on unit values as shown in the *Minerals Yearbook* of the Bureau of Mines.

3341—Secondary Nonferrous Metals

Quantities of copper, lead, zinc, and aluminum and alloys with copper, lead, tin, zinc and aluminum base are industry production figures. Data for all other nonferrous metals are based on data shown in the *Minerals Yearbook* and insofar as possible represent industry production only. The weights used are unit value added figures based on tabulations made by the Bureau of the Census.

3391—Iron and Steel Forgings and 3392—Wire Drawing

The product index was based on shipments of primary products by the industry rather that shipments of these primary products by all industries. This method of calculation was considered desirable because of the fact that some of the products classified in the industry are also primary to other industries and, therefore, are produced to a great but varying extent in those industries.

3489—Wirework, N.E.C.

The product index was based on shipments of primary products by the industry rather than shipments of these primary products by all industries. This method of calculation was considered desirable because of the fact that some of the products classified in the industry are produced to a great extent in other industries, particularly in 3312, Steel Works and Rolling Mills.

3585—Refrigeration Machinery

Because of large differences among product classes in the ratio of value added by manufacture to value of shipments, the special method of combining product class indexes with value added weights was employed for this industry. Industry value added and value of shipments were adjusted for changes in inventories.

3661—Radios and Related Products

Because of large differences among product classes in the ratio of value added by manufacture to value of shipments, the special method of combining product class indexes with value added weights was employed for this industry. Industry value added and value of shipments were adjusted for changes in inventories.

In view of the extensive changes that occurred between 1947 and 1954 in the specifications and quality of television receiving sets, it was felt that their physical output would be more adequately represented in the product index for this industry by a deflated value measure than by an attempt to measure physical volume directly. Accordingly, the value of television receiving sets shipped was deflated by the price change of cathode ray tubes, based on Radio and Television Manufacturers Association data. In this calculation, the 1950-1954 rather than the 1947-1954 price index was used as the deflator. Prices for years before 1950 were very high and related to a product which was still "new" and undergoing rapid development.

3662—Electronic Tubes

Adequate quantity data are available from the Census of Manufactures for all products of this industry except television picture tubes for which only summary totals are given. Although the Radio and Television Manufacturers Association compiles current information by size of picture tube, a satisfactory breakdown is lacking for 1947. In view of these data limitations and the extensive changes that have occurred over this 7-year span in the average size and quality of picture tubes, it was felt as in the case of television receivers (see note to Industry 3661) that physical output would be most adequately represented in the product index for all electronic tubes by a deflated value measure. The deflator was based on the Radio and Television Manufacturers Association data by size of tube.

Also as in the case of television receivers, the 1950-1954 rather than the 1947-1954 price index was taken as the deflator, because prices for years before 1950 were very high and related to a product which was still "new" and undergoing rapid development.

3717—Motor Vehicles and Parts

The product index consists of three separate indexes that were combined with value weights to cover the following segments: passenger cars, trucks and motor coaches, and replacement parts.

1. Passenger cars.—In order to obtain a better measure of the change in passenger car output than would be afforded by census statistics which provide only summary figures on the number of passenger cars shipped, trade association data were used extensively. The quantity of each make, model, and series of car produced, as shown in *Ward's Automotive Yearbook*, was priced at f. o. b. factory prices for the lowest priced 4-door sedan as shown in the National Automotible Dealers Association Official Used Car Guide. "Synthetic" 1954 prices for 1947 cars not manufactured in 1954, and 1947 prices for 1954 cars not manufactured in 1947 were estimated from price changes for similar models that were produced in both years. Adjustments were made for extra equipment including automatic transmission, overdrive, power steering, and power brakes; and by makes for convertibles, station wagons, and hardtops.

2. Replacement parts.--An estimate of the value of replacement parts produced in the industry was made from census data. This value was deflated by a price index based on information from various sources on related products.

3. Trucks and motor coaches.--The index was computed from census quantity and value data.

Since almost no passenger cars, trucks, or motor coaches are produced outside the motor vehicles industry, and since the replacement parts index was defined to cover only this industry, the aggregate product index represents the output of these products by the primary industry alone.

The industry index—Because establishments classified in this industry produce an immense volume of secondary products, consisting to a large extent of ordnance items, the standard method of deflating the change in their value of shipments by a price index derived from the product index was replaced by a more selective procedure. The various classes of secondary products were deflated by their corresponding price indexes (derived from the "home" industry indexes and from non-Census sources). The final industry index was obtained by combining the secondary product index and the product index with value weights.

Value added and value of shipments for this industry were adjusted for inventory changes.

3721—Aircraft

For this industry, data on airframe weight from the Census Bureau and the Defense Department were used in conjunction with Census value data to estimate unit value changes for completed aircraft. These unit value changes were used to deflate the "value of work done" on completed aircraft. ("Value of work done" is a Census statistic collected for this industry which reflects the dollar value of production rather than the value of products shipped.) The industry "value of work done" other than on completed aircraft was deflated by the Bureau of Labor Statistics wholesale price index for machinery and motive products.

3722—Aircraft Engines

Defense Department data for U. S. military aircraft engine acceptances, in terms of total pounds thrust and horsepower were used in constructing indexes for this industry. The value of products shipped other than U. S. military aircraft engines was deflated by the average of the unit value change for U. S. military aircraft engines and the Bureau of Labor Statistics wholesale price index for machinery and motive products. Industry value of shipments and value added figures were adjusted for inventory changes.

3731—Ship Building and Repairing

The quantity data used for construcing this index consisted of tonnage of work done on three classes of ships: military self-propelled, nonmilitary self-propelled, and nonmilitary nonpropelled. For the last-named category, tonnage of ships completed was related to Census value of shipments, while for the other two categories, tonnage of work done was related to census "value of work done" ("value of work done" is a census statistic collected for this industry which reflects the dollar value of production rather than the value of products shipped). Tonnage of work done was estimated by prorating the tonnage of each large ship worked on over the total length of time of its construction. The data for this calculation were obtained from *Marine Engineering*, the *Bulletin* of the American Bureau of Shipping, the Navy Department, and the Census Bureau.

Unit value changes based on the above quantity and value statistics were used to deflate total industry value of work done, including repair work. The proportion of total industry value of work done covered by the tonnage data was nearly three-fifths in 1954, but less than one-third in 1947.

3871—Watches and Clocks

Because of large differences among product classes in the ratio of value added to value of shipments, the special method of combining product classes with value added weights was employed for this industry.

APPENDIX A. —PRODUCTION INDEXES FOR SELECTED INDUSTRIES, CENSUS YEARS 1899-1954

(1947 = 100)

Code	Industry	1954	1947	1939	1937	1935	1933	1931	1929	1927	1925	1923	1921	1919	1914	1909	1904	1899
2022	Natural cheese	120	100	61	53	52	39	38	42	40	42	42	32	36	27	23	23	
2023	Concentrated milk	85	100	54	48	43	37	38	38	33	29	28	26	32	14	7	4	
2025	Special dairy products	100	100	41	33													
2031	Canned seafood	107	100	82	76													
2032	Cured fish	103	100	94	80	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)		
2033	Canned fruits and vegetables	124	100	63	61													
2043	Cereal breakfast foods	98	100	80	81	73	82	104	104	84	73						(NA)	
2044	Rice milling	132	100	69	60	54	58	57	57	43	54	53	50	31	29	29		
2051	Bread and related products	102	100	73	70	64	54	68	74	66	58	56	(NA)	(NA)	(NA)	(NA)		(NA)
2052	Biscuit and crackers	126	100	78	73	66	54	59	69	63	59	56						
2061	Raw cane sugar	118	100	128	101	91	66	48	53	19	36	46	68	66	70	88		
2062	Cane-sugar refining	104	100	80	86	80	75	84	97	97	102	84	72	77	63	(NA)		
2063	Beet sugar	106	100	91	73	68	93	66	61	51	62	42	59	41	42	28	14	4
2071	Confectionery products	98	100	80	78	71	56	56	70	66	64	(NA)	(NA)					
2072	Chocolate and cocoa products	90	100	85	72	82	61	58	58	56	53	48	35	(NA)	(NA)	(NA)	(NA)	(NA)
2081	Bottled soft drinks	124	100	54	38	20	13	25	(NA)	(NA)	(NA)	(NA)	(NA)					
2082	Beer and ale	106	100	56	58	45	11	3	4	4	5	5	9	28	66	56	48	36
2083	Malt	87	100	59	62	54	32	22	25	20	21							
2091	Leavening compounds	83	100	76	70	80	81	106	110	97	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)		
2092	Shortening and cooking oils	157	100	75	75	68	50	50	51	50							(NA)	(NA)
2093	Margarine	140	100	49	55	42	28	31	44	35	32							
2094	Corn wet milling	99	100	62	54	43	54	49	64	59	49	49	37	44	32	30		
2095	Flavorings	151	100	63	51	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)		
2097	Manufactured ice	47	100	71	72	69	70	91	95	84	83	73	64	57	41	28	16	9
2098	Macaroni and spaghetti	108	100	83	80	75	63	65	59									
2121	Cigars	109	100	94	96	85	79	99	121									
2223	Thread mills	126	100	78	(NA)					(NA)	(NA)	(NA)						
2251	Full-fashioned hosiery mills	120	100	110	93	(NA)	(NA)	(NA)	(NA)				(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
2252	Seamless hosiery mills	121	100	98	79													
2253	Knit outerwear mills	138	100	72	71													
2254	Knit underwear mills	81	100	78	73	71	70	56	72	73	76	74						
2271	Wool carpets and rugs	81	100	60	61	57	40	41	66	59	63	67	39	41	47	52	43	40
2274	Hard-surface floor coverings	88	100	56	55	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
2281	Fur-felt hats and hat bodies	50	100	120	113	107	...	88	113	118	98	106	91	107	103	142	120	90
2282	Wool-felt hats and hat bodies	72	100	95	79	57	...	26	31	27	22	22	15	24	20	31	21	42
2284	Hatters' fur	45	100	109	90	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)			
2291	Felt goods, n.e.c	124	100	88	90													
2292	Lace goods	91	100	76	78	72	(NA)	40	50	48	45	51	34	44	37	(NA)		(NA)
2293	Padding and upholstery filling	111	100	69	64	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)			
2294	Processed textile waste	110	100	82	85													
2298	Cordage and twine	92	100	93	92	73	71	69	101	95	95	97	75	93	99	83		67
2321	Men's dress shirts and nightwear	134	100	88	73	71	62											
2322	Men's and boys' underwear	157	100	100	118													
2323	Men's and boys' neckwear	87	100	103	111	(NA)	(NA)	(NA)	(NA)									
2371	Fur goods	65	100	103	90												(NA)	
2382	Suspenders and garters	60	100	198	181	197	177	286	218	(NA)								
2386	Leather and sheep-lined clothing	142	100	142	107	(NA)	(NA)	(NA)	(NA)									
2388	Handkerchiefs	83	100	126	120	110	106	140	139		(NA)	(NA)						
2425	Excelsior mills	137	100	87	88	76	65	80	127				(NA)	(NA)	(NA)	(NA)		
2445	Cooperage	50	100	89	111	104	97	120	175	172								
2492	Lasts and related products	63	100	84	66	(NA)	(NA)	(NA)	(NA)	(NA)								(NA)
2515	Mattresses and bedsprings	139	100	74	65													
2611	Pulp mills	151	100	61	58	44	37	37	42	36								
2825	Synthetic fibers	169	100	38	34	28	22	15	11	7	4	3						
2826	Explosives	210	100	66	63	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)						
2841	Soap and glycerin	109	100	72	62	57	56	56	57	53	49	62	45	51	40	35	26	
2851	Paints and varnishes	110	100	55	57													
2852	Inorganic color pigments	96	100	54	49													
2861	Hardwood distillation	93	100	144	164	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	
2862	Softwood distillation	130	100	65	56													
2863	Gum naval stores	72	100	169	202													
287	Fertilizers	153	100	48	51	37	29	37	48	43	42	36	28	38	42	29	18	14
2881	Cottonseed oil mills	168	100	109	107	85	122	112	130	157	140	90	104	144	174	95	95	66
2882	Linseed oil mills	132	100	122	143	106	...	111	166	157	166	139						
2886	Grease and tallow	148	100	74	46	(NA)	(NA)	(NA)	(NA)	(NA)								
2891	Printing ink	129	100	68	66						(NA)	(NA)	(NA)					
2896	Compressed and liquefied gases	146	100	42	42	29	21	25	30	21								
2898	Salt	100	100	86	86	(NA)	(NA)	(NA)	(NA)	(NA)								
3011	Tires and inner tubes	92	100	56	54	48	43	44	67	61	59	46	26	(NA)	(NA)	(NA)	(NA)	(NA)
3021	Rubber footwear	69	100	67	77	(NA)	(NA)	(NA)	(NA)									
3031	Reclaimed rubber	209	100	58	62					(NA)	(NA)	(NA)	(NA)					
3099	Rubber industries, n.e.c	152	100	52	42													
3111	Leather tanning and finishing	82	100	80	81	75	62	59	72									
3131	Footwear cut stock	83	100	97	98	(NA)	(NA)	(NA)	(NA)									
3161	Luggage	127	100	70	74													

See footnotes at end of table.

(1947 = 100)

Code	Industry	1954	1947	1939	1937	1935	1933	1931	1929	1927	1925	1923	1921	1919	1914	1909	1904	1899
3171	Handbags and purses	132	100	113	84													
3211	Flat glass	123	100	59	76	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	
3221	Glass containers	100	100	44	46													
3229	Pressed and blown glass, n.e.c	132	100	81	83													
3241	Cement, hydraulic	136	100	66	62	40	33	68	91	91	86	70	54	52	56	39	17	
3251	Brick and hollow tile	132	100	96	87													
3253	Floor and wall tile	180	100	70	62													
3254	Sewer pipe	118	100	80	72													
3255	Clay refractories	78	100	66	86													
3261	Vitreous plumbing fixtures	129	100	49	46	(NA)	(NA)	(NA)	(NA)	(NA)								(NA)
3272	Gypsum products	177	100	45	39													
3322	Malleable-iron foundries	99	100	61	79													
3323	Steel foundries	82	100	51	80						(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	
3411	Tin cans and other tinware	135	100	63	61	46	36	35	38	33								
3424	Files	77	100	71	94	64	58	56	89									
3441	Structural																	
3441	Structural and ornamental work	151	100	62	60					(NA)								
3442	Metal doors, sash, and trim	231	100	34	28	(NA)	(NA)	(NA)	(NA)									
3493	Steel springs	95	100	44	56													
3871	Watches and clocks	101	100	48	59	33	20	27	42	48								
3872	Watchcases	79	100	47	69	(NA)	(NA)	(NA)	(NA)	(NA)								
3983	Watches	95	100	83	80													

Code	Industry title	1954			1947		
		All employees[1] (1,000)	Industry ratio (percent)		All employees[1] (1,000)	Industry ratio (percent)	
			Specialization[2]	Coverage[3]		Specialization[2]	Coverage[3]
20	Food and kindred products:						
201	Meat products	311.4	97	99	274.5	(NA)	(NA)
2011	Meat packing plants	265.2	98	99	252.9	96	99
2013	Prepared meats						
2015	Poultry dressing plants	[1]46.2	96	97	21.6	88	88
202	Dairy products	283.4	99	99	(NA)	(NA)	(NA)
2021	Creamery butter	21.0	74	77	27.1	79	84
2022	Natural cheese	13.9	83	74	12.8	84	83
2023	Concentrated milk	13.3	82	68	18.3	84	77
2024	Ice cream and ices	36.5	93	70	46.7	90	87
2025	Special dairy products	7.3	90	[4]56	7.5	91	(NA)
2026	Fluid milk	14.1	82	94	(NA)	(NA)	(NA)
2027	Fluid milk and other products	177.3					
203	Canned and frozen foods	199.2	95	97	201.1	(NA)	(NA)
2031	Canned seafood	[1]15.1	96	94	20.2	91	96
2032	Cured fish	[1]1.7	97	91	2.4	97	88
2033	Canned fruits and vegetables	[1]119.8	90	94	135.9	91	94
2034	Dehydrated fruits and vegetables	7.0	95	97	4.0	96	90
2035	Pickles and sauces	[1]21.9	80	75	21.3	84	69
2036	Packaged seafood	33.6	90	87	(NA)	(NA)	(NA)
2037	Frozen fruits and vegetables						
204	Grain-mill products	110.0	99	90	113.2	(NA)	(NA)
2041	Flour and meal	34.6	91	93	42.7	(NA)	(NA)
2045	Flour mixes						
2042	Prepared animal feeds	59.9	95	90	55.2	95	89
2043	Cereal breakfast foods	11.5	77	80	11.3	68	87
2044	Rice milling	[1]4.0	99	100	4.1	100	100
205	Bakery products	291.1	99	99	278.8	99	99
2051	Bread and related products	246.3	98	99	232.7	98	99
2052	Biscuit and crackers	44.8	97	93	46.1	96	93
206	Sugar	[1]30.2	100	100	35.4	100	100
2061	Raw cane sugar	[1]3.1	[5]96	97	4.6	[5]97	100
2062	Cane-sugar refining	[1]16.1	[5]100	100	17.4	[5]100	100
2063	Beet sugar	[1]11.0	[5]99	100	13.4	100	100
207	Candy and related products	80.4	97	95	91.7	(NA)	(NA)
2071	Confectionery products	66.8	95	96	75.2	97	97
2072	Chocolate and cocoa products	8.5	98	89	9.6	[5]99	100
2073	Chewing gum	5.2	[5]95	98	6.9	(D)	(D)
208	Beverages	202.8	99	100	202.6	(NA)	(NA)
2081	Bottled soft drinks	91.6	98	99	79.4	99	99
2082	Beer and ale	81.3	100	100	82.5	100	99
2083	Malt	2.6	100	100	2.5	100	100
2084	Wines and brandy	[1]5.7	[6]90	96	7.7	[6]90	100
2085	Distilled liquor	[1]21.5	99	100	30.4	99	99
209	Miscellaneous foods	138.7	95	89	151.8	(NA)	(NA)
2091	Leavening compounds	2.7	89	90	3.1	(D)	(D)
2092	Shortening and cooking oils	[1]9.4	85	89	8.0	82	96
2093	Margarine	[1]2.6	90	62	2.6	81	73
2094	Corn wet milling	13.6	91	96	12.3	88	96
2095	Flavorings	10.6	91	87	11.7	93	89
2097	Manufactured ice	[1]20.9	100	97	46.5	100	98
2098	Macaroni and spaghetti	7.1	98	95	8.0	[5]98	99
2099	Food preparations, n.e.c.	[1]72.0	94	86	59.6	92	80
21	Tobacco manufactures:						
2111	Cigarettes	[1]30.0	99	100	27.7	96	100
2121	Cigars	[1]38.5	99	100	47.1	99	100
2131	Chewing and smoking tobacco	[1]7.5	96	89	11.1	98	86
2141	Tobacco stemming and redrying	[1]18.8	100	99	25.9	100	98
22	Textile mill products:						
221	Woolen and worsted manufactures	91.5	97	93	179.7	(NA)	(NA)
2211	Scouring and combing plants	7.0	83	60	8.4	(NA)	(NA)
2212	Yarn mills, wool, except carpet	17.8	93	85	33.2	90	81
2213	Woolen and worsted fabrics	62.5	92	95	132.3	90	97
2216	Finishing wool textiles	4.2	([8])	([8])	5.8	([8])	([8])
222	Yarn and thread mills	111.0	95	93	151.0	(NA)	(NA)
2222	Yarn thowing mills	11.8	93	79	14.9	(NA)	(NA)
2223	Thread mills	13.9	88	94	14.7	85	(NA)
2224	Yarn mills, cotton system	85.3	95	92	121.4	(NA)	(NA)
2225	Yarn mills, silk system						
223	Broad woven fabrics	386.2	95	88	427.8	(NA)	(NA)
2233	Cotton broad-woven fabrics	296.2	94	84	330.2	(NA)	(NA)
2234	Synthetic broad-woven fabrics	90.0	87	90	97.6	85	(NA)
2241	Narrow fabric mills	25.7	96	94	28.1	95	98

See footnotes at end of table.

Code	Industry title	1954			1947		
		All employees[1] (1,000)	Industry ratio (percent)		All employees[1] (1,000)	Industry ratio (percent)	
			Specialization[2]	Coverage[3]		Specialization[2]	Coverage[3]
22	Textile mill products--Continued						
225	Knitting mills	221.4	98	(NA)	229.3	(NA)	(NA)
2251	Full-fashioned hosiery mills	60.2	[6]90	[6]90	70.0	[6]90	[6]90
2252	Seamless hosiery mills	63.4	96	93	64.9	96	91
2253	Knit outerwear mills	46.4	93	73	34.5	91	82
2254	Knit underwear mills	31.3	88	39	40.6	87	70
2255	Knit glove mills	2.0	86	20	4.8	91	34
2256	Knit fabric mills	16.8	94	91	13.5	93	88
2259	Knitting mills, n.e.c	1.4	62	75	1.0	98	89
2261	Finishing textiles, except wool	79.3	86	41	78.0	(NA)	(NA)
227	Carpets and rugs	51.2	95	98	57.1	(NA)	(NA)
2271	Wool carpets and rugs	30.1	[6]90	[6]95	40.1	[6]90	[6]95
2273	Carpets and rugs, except wool	11.5	95	83	7.1	84	86
2274	Hard-surface floor coverings	[1]9.6	85	97	9.9	91	100
228	Hats, except cloth and millinery	13.0	98	98	21.4	(NA)	(NA)
2281	Fur-felt hats and hat bodies	8.2	92	93	13.0	94	97
2282	Wool-felt hats and hat bodies	1.8	82	96	4.4	76	97
2283	Straw hats	2.3	87	75	2.4	83	74
2284	Hatters' fur	.8	95	100	1.5	(D)	(D)
229	Miscellaneous textile goods	58.2	93	90	60.0	(NA)	(NA)
2291	Felt goods, n.e.c	6.0	90	92	4.7	95	97
2292	Lace goods	7.4	99	94	8.6	94	97
2293	Paddings and upholstery filling	9.1	91	90	8.3	96	92
2294	Processed textile waste	5.8	96	93	5.8	94	94
2295	Coated fabrics, except rubberized	[1]8.5	86	82	8.6	84	82
2298	Cordage and twine	12.3	90	89	16.4	87	87
2299	Textile goods, n.e.c	9.0	88	81	7.6	87	76
23	Apparel and related products:						
231	Men's and boys' suits and coats	121.7	91	96	151.1	92	97
2311	Men's and boys' suits and coats	119.0	91	96	147.1	92	97
2312	Suit and coat findings	2.7	98	95	4.0	99	99
232	Men's and boys' furnishings	285.6	94	81	253.0	(NA)	(NA)
2321	Men's dress shirts and nightwear	108.3	90	85	94.2	94	87
2322	Men's and boys' underwear	9.4	88	28	7.3	95	21
2323	Men's and boys' neckwear	9.5	98	92	10.7	97	91
2325	Men's and boys' cloth hats	8.1	97	87	5.5	96	82
2326	Hat and cap materials	.9	99	94	1.1	97	99
2327	Separate trousers	51.7	89	74	47.3	86	70
2328	Work shirts	97.8	86	79	87.4	(NA)	(NA)
2329	Men's and boys' clothing, n.e.c						
233	Women's and misses' outerwear	363.9	98	92	313.1	(NA)	(NA)
2331	Blouses	43.0	93	85	32.9	93	88
2333	Dresses, unit price	143.3	96	95	133.8	95	97
2334	Dresses, dozen price	54.5	94	96	48.6	89	96
2337	Women's suits, coats, and skirts	96.0	94	93	82.7	95	93
2338	Women's neckwear and scarfs	1.7	95	75	2.8	96	96
2339	Women's outerwear, n.e.c	25.4	82	44	12.4	70	33
234	Women's undergarments	112.2	96	88	94.6	(NA)	(NA)
2341	Women's and children's underwear	73.4	95	85	58.0	95	78
2342	Corsets and allied garments	38.8	96	95	36.6	94	96
2351	Millinery	20.2	99	98	20.9	99	98
236	Children's outerwear	77.5	94	83	48.2	(NA)	(NA)
2361	Children's dresses	32.5	95	93	22.5	93	91
2363	Children's coats	14.4	91	81	11.0	91	87
2369	Children's outerwear, n.e.c	30.6	78	62	14.8	(NA)	(NA)
2371	Fur goods	[1]10.0	99	100	16.2	100	100
238	Miscellaneous apparel	64.3	92	86	57.8	89	47
2381	Fabric dress gloves	4.5	94	72	5.6	89	47
2382	Fabric work gloves	10.1	95	93	10.9	94	96
2383	Suspenders and garters	.9	78	60	1.7	74	54
2384	Robes and dressing gowns	11.0	93	84	10.9	89	82
2385	Waterproof outer garments	12.9	89	81	8.6	85	73
2386	Leather and sheep-lined clothing	5.4	85	80	4.2	79	80
2387	Belts	12.6	92	94	9.2	90	95
2388	Handkerchiefs	3.5	98	98	4.6	98	95
2389	Apparel, n.e.c	3.5	90	91	2.2	96	86
239	Fabricated textiles, n.e.c	134.6	94	77	126.7	(NA)	(NA)
2391	Curtains and draperies	14.0	94	89	8.0	97	90
2392	Housefurnishings, n.e.c	36.2	91	[9]59	39.9	93	[9]87
2393	Textile bags	12.1	84	85	13.9	93	98
2394	Canvas products	13.5	89	86	10.6	91	93
2395	Tucking, pleating, and stitching	6.5	([8])	([8])	5.9	([8])	([8])
2396	Trimmings and art goods	17.8	97	83	14.5	94	95
2397	Schiffli-machine embroideries	5.7	98	99	5.7	98	96
2398	Embroideries, except Schiffli	10.8	98	96	9.8	97	96
2399	Textile products, n.e.c	18.0	87	77	18.3	88	87

See footnotes at end of table.

Code	Industry title	1954			1947		
		All employees[1] (1,000)	Industry ratio (percent)		All employees[1] (1,000)	Industry ratio (percent)	
			Specialization[2]	Coverage[3]		Specialization[2]	Coverage[3]
24	Lumber and wood products:						
2411	Logging camps and contractors	75.5	98	89	(NA)	(NA)	(NA)
242	Lumber and basic products	341.4	96	81	409.8	(NA)	(NA)
2421	Sawmills and planing mills	321.2	97	81	383.4	(NA)	(NA)
2422	Veneer mills	12.8	93	88	10.5	92	83
2423	Shingle mills	2.5	97	90	2.4	100	86
2424	Cooperage stock mills	[1]3.4	96	93	12.3	96	92
2425	Excelsior mills	1.4	96	93	1.2	100	97
243	Millwork and related products	119.4	93	94	97.4	(NA)	(NA)
2431	Millwork plants	68.7	90	91	59.8	90	92
2432	Plywood plants	39.2	93	95	27.5	93	96
2433	Prefabricated wood products	11.5	99	95	10.1	93	96
244	Wooden containers	52.3	94	88	69.1	(NA)	(NA)
2441	Fruit and vegetable baskets	6.7	91	88	9.1	91	88
2442	Rattan and willow ware	1.3	91	93	1.1	89	93
2443	Cigar boxes	1.1	97	94	1.9	100	85
2444	Wooden boxes	39.5	93	85	47.8	96	85
2445	Cooperage	[1]3.7	97	99	9.2	96	97
249	Miscellaneous wood products	57.4	93	92	65.5	(NA)	(NA)
2491	Wood preserving	12.1	97	99	16.2	(D)	(D)
2492	Lasts and related products	1.5	99	95	2.0	(D)	(D)
2493	Mirror and picture frames	5.2	89	93	3.8	89	92
2499	Wood products, n.e.c	38.6	91	87	43.5	87	94
25	Furniture and fixtures:						
251	Household furniture	243.9	96	95	228.4	(NA)	(NA)
2511	Wood furniture, not upholstered	124.9	94	93	132.1	94	94
2512	Upholstered household furniture	56.0	94	85	44.8	92	83
2514	Metal household furniture	29.6	87	83	19.7	83	73
2515	Mattresses and bedsprings	32.1	77	91	30.3	76	93
2519	Household furniture, n.e.c	1.3	86	59	1.7	83	71
252	Office furniture	21.7	84	87	20.8	(NA)	(NA)
2521	Wood office furniture	5.5	86	86	6.5	92	80
2522	Metal office furniture	16.1	84	87	14.3	89	92
253	Public and professional furniture	19.6	84	81	15.4	(NA)	(NA)
2531	Public-building furniture	14.0	83	86	10.2	68	80
2532	Professional furniture	5.5	81	68	5.2	62	67
2541	Partitions and fixtures	33.1	88	87	27.8	88	89
256	Screens, shades and blinds	18.2	86	84	19.7	(NA)	(NA)
2561	Window and door screens	4.4	73	64	4.2	65	61
2562	Window shades	4.4	85	78	5.7	73	79
2563	Venetian blinds	9.4	85	93	9.7	96	92
259	Furniture and fixtures, n.e.c	4.2	75	74	4.2	(NA)	(NA)
2591	Restaurant furniture	3.4	72	78	3.4	87	69
2599	Furniture and fixtures, n.e.c	.8	83	61	.9	91	56
26	Pulp, paper and products:						
261	Pulp, paper, and board	216.3	99	100	197.9	99	100
2611	Pulp mills	57.7	99	100	50.3	99	100
2612	Paper and paper board mills	142.2	99	100	134.2	100	100
2613	Building paper and board mills	16.4	98	97	13.4		
2641	Paper coating and glazing	27.7	85	86	22.3	87	92
2651	Envelopes	15.9	96	92	13.8	92	95
2661	Paper bags	33.3	91	88	22.2	96	86
267	Paperboard containers	145.1	96	98	119.0	97	98
2671	Paperboard boxes	133.0	96	98	109.7	97	98
2674	Fiber cans, tubes, drums, etc	12.1	97	87	9.2	97	93
269	Pulp,paper and products, etc	92.0	91	89	78.9	(NA)	(NA)
2691	Die-cut paper and board	12.3	88	82	9.3	(NA)	(NA)
2693	Wallpaper	3.6	99	98	5.5	98	100
2694	Pulp goods, pressed and molded	2.9	100	93	1.7	95	86
2699	Paper and board products, n.e.c	73.2	90	89	62.4	86	86
27	Printing and publishing:						
2711	Newspapers	281.8	95	100	234.4	94	100
2721	Periodicals	62.4	95	97	69.0	94	98
273	Books	57.4	89	80	52.0	(NA)	(NA)
2731	Books: publishing and printing	34.7	91	90	39.9	92	93
2732	Book printing	22.7	76	55	12.0	77	44
2741	Miscellaneous publishing	18.4	85	82	12.0	93	78
2751	Commercial printing	200.2	85	86	191.7	86	86
2761	Lithographing	77.7	82	79	52.4	77	77
2771	Greeting cards	21.3	93	89	18.1	92	87
278	Bookbinding and related industries	37.3	89	85	42.6	(NA)	(NA)
2781	Bookbinding	17.2	91	86	22.2	84	87
2782	Blankbooks and paper ruling	8.6	76	66	8.8	85	66
2783	Loose-leaf binders and devices	8.2	74	82	8.1	75	83
2789	Miscellaneous bookbinding work	3.3	84	83	3.4	87	79

See footnotes at end of table.

Code	Industry title	1954			1947		
		All employees[1] (1,000)	Industry ratio (percent)		All employees[1] (1,000)	Industry ratio (percent)	
			Special-ization[2]	Coverage[3]		Special-ization[2]	Coverage[3]
27	Printing and publishing--Continued						
279	Printing trades service	47.8	96	91	43.1	(NA)	(NA)
2791	Typesetting	14.6	94	87	11.5	94	87
2792	Engraving and plate printing	7.5	93	79	7.7	92	80
2793	Photoengraving	17.7	95	93	16.7	96	95
2794	Electrotyping and stereotyping	8.0	89	89	7.2	92	87
28	Chemicals and products:						
281	Inorganic chemicals	121.3	89	83	62.5	(NA)	(NA)
2812	Alkalies and chlorine	20.4	76	84	19.9	81	85
2811	Sulfuric acid	} 100.8	89	80	42.6	87	80
2819	Inorganic chemicals, n.e.c						
282	Organic chemicals	245.5	91	90	203.9	(NA)	(NA)
2821	Cyclic (coal-tar) crudes	1.9	82	72	2.0	85	78
2822	Intermediates and organic colors	32.7	64	66	33.6	(NA)	(NA)
2823	Plastics materials	41.1	90	[4]75	28.6	92	[4]77
2824	Synthetic rubber	8.5	98	90	7.7	96	89
2825	Synthetic fibers	61.1	96	99	69.7	97	98
2826	Explosives	32.5	98	91	10.4	87	99
2829	Organic chemicals, n.e.c	67.5	77	80	51.9	(NA)	(NA)
283	Drugs and medicines	92.1	94	94	81.5	(NA)	(NA)
2831	Biological products	4.0	86	65	3.0	87	57
2833	Medicinal chemicals, including botanicals	11.5	69	59	13.1	73	74
2834	Pharmaceutical preparations	76.6	91	94	65.4	91	98
284	Soap and related products	46.2	87	64	44.9	(NA)	(NA)
2841	Soap and glycerin	25.8	84	74	27.5	81	91
2842	Cleaning and polishing products	18.0	80	[4]45	15.4	70	[4]52
2843	Sulfonated oils and assistants	2.4	74	78	2.0	77	76
285	Paints and allied products	70.0	95	95	69.0	(NA)	(NA)
2851	Paints and varnishes	56.6	95	97	53.4	94	96
2852	Inorganic color pigments	12.2	88	88	14.3	88	84
2853	Whiting and fillers	1.2	89	47	1.3	81	53
286	Gum and wood chemicals	7.3	76	98	8.5	(NA)	(NA)
2861	Hardwood distillation	1.6	91	100	1.9	94	96
2862	Softwood distillation	4.4	68	98	4.6	83	99
2863	Gum naval stores	.5	88	95	.6	98	99
2865	Tanning and dyeing materials	.7	83	92	1.4	88	78
287	Fertilizers	[1]31.8	96	97	32.0	98	95
2871	Fertilizers	} 31.8	96	97	32.0	98	95
2872	Fertilizers, mixing only						
288	Vegetable and animal oils	40.0	91	88	43.3	(NA)	(NA)
2881	Cottonseed oil mills	[1]13.7	96	93	14.4	90	90
2882	Linseed oil mills	[1]1.3	94	90	1.6	77	87
2883	Soybean oil mills	[1]6.9	88	96	6.5	96	80
2884	Vegetable oil mills, n.e.c	[1]2.5	58	80	5.0	80	89
2886	Grease and tallow	11.5	88	[4]55	12.4	90	[4]52
2887	Fatty acids	[1]1.9	68	73	1.3	86	76
2889	Animal oils, n.e.c	[1]2.3	89	[10]66	2.2	94	([10])
289	Chemical products, n.e.c	85.4	90	79	81.0	(NA)	(NA)
2891	Printing ink	7.6	90	95	6.0	92	98
2892	Essential oils	.5	83	67	1.2	71	92
2893	Toilet preparations	24.8	91	[4]77	27.2	84	[4]72
2894	Glue and gelatin	6.8	87	67	7.9	82	76
2895	Carbon black	3.4	100	98	3.2	100	97
2896	Compressed and liquefied gases	10.4	99	84	9.0	100	84
2897	Insecticides and fungicides	6.5	84	82	4.1	87	68
2898	Salt	4.0	96	97	4.8	100	98
2899	Chemical products, n.e.c	21.4	81	70	17.6	75	64
29	Petroleum and coal products:						
291	Petroleum refining	153.1	99	98	145.8	99	97
2911	Petroleum refining	} 161.2	99	100	153.8	(NA)	(NA)
2992	Lubricants, n.e.c						
293	Coke and byproducts	32.5	100	100	32.8	100	100
2931	Beehive coke ovens	.6	100	[4]1	3.1	100	[4]9
2932	Byproduct coke ovens	31.9	100	[4]99	29.7	100	[4]92
295	Paving and roofing materials	20.1	93	95	19.3	(NA)	(NA)
2951	Paving mixtures and blocks	4.4	97	94	2.8	99	88
2952	Roofing felts and coatings	15.7	91	94	16.5	95	95
299	Petroleum and coal products, n.e.c	10.2	89	22	9.7	(NA)	(NA)
2999	Petroleum and coal products, n.e.c	2.0	94	89	1.7	100	100
30	Rubber products:						
3011	Tires and inner tubes	92.7	88	99	115.7	90	95
3021	Rubber footwear	18.3	84	85	28.1	80	99
3031	Reclaimed rubber	3.0	87	74	2.1	95	44
3099	Rubber industries, n.e.c	132.5	88	78	112.4	85	81
31	Leather and leather goods:						
3111	Leather tanning and finishing	43.5	98	100	53.3	100	100
3121	Industrial leather belting	4.6	97	92	5.0	91	98
3131	Footwear cut stock	20.1	97	96	22.1	99	97

See footnotes at end of table.

Code	Industry title	1954			1947		
		All employees[2] (1,000)	Industry ratio (percent)		All employees[2] (1,000)	Industry ratio (percent)	
			Specialization[2]	Coverage[3]		Specialization[2]	Coverage[3]
31	Leather and leather goods--Continued						
314	Footwear, except rubber	230.3	100	100	240.3	(NA)	(NA)
3141	Footwear, except rubber	219.4	99	99	230.9	99	100
3142	House slippers	10.9	89	87	9.4	93	83
315	Leather gloves	6.9	88	90	11.6	91	91
3151	Leather dress gloves	4.4	86	91	8.9	94	95
3153	Leather work gloves	2.5	82	81	2.7	82	82
3161	Luggage	[1]15.9	94	97	16.0	94	97
317	Purses and small leather goods	29.5	96	96	26.0	97	95
3171	Handbags and purses	[1]22.9	97	98	20.4	99	97
3172	Small leather goods	[1]6.7	91	87	5.6	90	90
319	Miscellaneous leather goods	5.9	92	85	9.0	(NA)	(NA)
3192	Saddlery, harness, and whips	[1]1.3	88	87	2.9	86	92
3199	Leather goods, n.e.c	[1]4.6	91	82	6.2	90	80
32	Stone, clay, and glass products:						
3211	Flat glass	24.6	[11]90	(D)	25.3	99	75
322	Pressed and blown glassware	91.3	99	99	89.3	(NA)	(NA)
3221	Glass containers	49.4	98	99	47.1	(D)	(D)
3229	Pressed and blown glass, n.e.c	41.9	98	96	42.2	96	91
3231	Products of purchased glass	21.6	97	75	23.9	97	85
3241	Cement, hydraulic	39.8	99	100	35.7	100	100
325	Structural clay products	72.8	97	99	69.3	(NA)	(NA)
3251	Brick and hollow tile	32.4	96	98	29.6	95	97
3253	Floor and wall tile	11.3	91	99	6.8	97	95
3254	Sewer pipe	9.6	88	92	9.1	83	92
3255	Clay refractories	14.5	92	95	18.0	93	94
3259	Structural clay products, n.e.c	5.0	89	72	5.7	83	70
326	Pottery and related products	50.9	98	95	58.0	(NA)	(NA)
3261	Vitreous plumbing fixtures	9.2	99	99	7.8	98	99
3262	Vitreous-china food utensils	8.7	95	96	11.1	97	97
3263	Earthenware food utensils	13.3	98	92	16.7	92	97
3264	Porcelain electrical supplies	9.6	94	87	11.5	89	93
3265	China decorating for the trade	.5	100	100	1.0	100	98
3269	Pottery products, n.e.c	9.6	95	90	9.7	95	83
327	Concrete and plaster products	89.6	96	98	70.2	(NA)	(NA)
3271	Concrete products	60.4	99	99	46.8	99	99
3272	Gypsum products	11.0	95	98	7.5	97	98
3274	Lime	8.0	84	97	7.0	93	97
3275	Mineral wool	10.2	95	93	8.9	(D)	(D)
3281	Cut-stone and stone products	21.6	93	99	9.9	100	98
329	Nonmetallic mineral products, n.e.c	79.6	94	89	79.6	(NA)	(NA)
3291	Abrasive products	22.3	94	87	21.0	94	86
3292	Asbestos products	22.0	87	93	21.6	87	90
3293	Gaskets and asbestos insulations	12.8	86	70	13.2	83	75
3295	Minerals: ground or treated	7.7	98	87	8.9	94	88
3297	Nonclay refractories	8.6	96	90	10.3	94	91
3298	Statuary and art goods	1.7	89	99	2.0	91	97
3299	Nonmetallic mineral products, n.e.c	4.5	84	94	2.6	86	76
33	Primary metal industries:						
331	Blast furnaces and steel mills	530.1	96	92	545.7	(NA)	(NA)
3311	Blast furnaces	47.8	96	100	46.6	(NA)	(NA)
3313	Electrometallurgical products						
3312	Steel works and rolling mills	529.4	(NA)	(NA)	537.0	(NA)	(NA)
3393	Welded and heavy-riveted pipe						
3399	Primary metal industries, n.e.c						
332	Iron and steel foundries	212.4	94	90	266.0	(NA)	(NA)
3321	Gray-iron foundries	133.9	94	87	173.8	92	87
3322	Malleable-iron foundries	23.4	86	89	29.9	88	91
3323	Steel foundries	55.1	88	87	62.3	89	83
333	Primary nonferrous metals	54.5	91	94	43.1	(NA)	(NA)
3331	Primary copper	13.8	(7)	(7)	14.6	(7)	(7)
3332	Primary lead	4.1	(7)	(7)	4.7	(7)	(7)
3333	Primary zinc	10.5	87	91	12.4	(NA)	100
3334	Primary aluminum	20.6	100	99	8.9	(NA)	100
3339	Primary nonferrous metals, n.e.c	5.5	89	50	2.5	(NA)	16
3341	Secondary nonferrous metals	15.8	93	64	18.1	(NA)	(NA)
335	Nonferrous rolling and drawing	89.1	96	92	88.8	(NA)	(NA)
3351	Copper rolling and drawing	41.9	95	90	53.9	(NA)	92
3352	Aluminum rolling and drawing	36.8	92	93	27.4	(NA)	96
3359	Rolling and drawing, n.e.c	10.4	94	84	7.6	(NA)	94
3361	Nonferrous foundries	73.5	90	92	66.8	93	92
339	Primary metal industries, n.e.c	141.8	94	35	129.6	(NA)	(NA)
3391	Iron and steel forgings	39.8	88	73	36.7	95	77
3392	Wire drawing	54.9	95	[4]39	55.0	96	[4]37

See footnotes at end of table.

Code	Industry title	1954			1947		
		All employees[1] (1,000)	Industry ratio (percent)		All employees[1] (1,000)	Industry ratio (percent)	
			Specialization[2]	Coverage[3]		Specialization[2]	Coverage[3]
34	Fabricated metal products:						
3411	Tin cans and other tinware	55.2	98	99	46.8	97	99
342	Cutlery, tools, and hardware	143.7	87	90	154.5	(NA)	(NA)
3421	Cutlery	15.1	88	96	20.2	93	94
3422	Edge tools	7.1	83	76	8.5	81	76
3423	Hand tools, n.e.c	23.4	86	83	35.4	81	85
3424	Files	2.9	98	93	4.4	94	93
3425	Hand saws and saw blades	6.9	71	90	8.4	78	87
3429	Hardware, n.e.c	88.3	86	90	77.5	89	91
343	Heating and plumbing equipment	105.9	85	86	151.6	(NA)	(NA)
3431	Plumbing fixtures and fittings	30.6	87	89	34.7	90	92
3439	Heating and cooking equipment, n.e.c	75.3	84	85	116.8	86	86
344	Structural metal products	284.1	92	91	213.0	(NA)	(NA)
3441	Structural and ornamental work	116.3	89	88	79.1	86	88
3442	Metal doors, sash and trim	43.3	87	89	23.3	84	87
3443	Boiler shop products	74.4	82	81	68.2	80	80
3444	Sheet-metal work	50.2	81	80	42.4	83	82
346	Metal stamping and coating	183.8	85	(NA)	184.0	(NA)	(NA)
3461	Vitreous-enameled products	7.3	72	65	11.6	75	67
3463	Metal stampings	128.2	82	83	133.4	86	81
3465	Enameling and lacquering	5.5	(8)	(8)	4.0	(8)	(8)
3466	Galvanizing	3.2	(8)	(8)	2.9	(8)	(8)
3467	Engraving on metal	3.6	(8)	(8)	3.5	(8)	(8)
3468	Plating and polishing	36.1	(8)	(8)	28.6	(8)	(8)
3471	Lighting fixtures	45.1	90	91	46.9	90	89
348	Fabricated wire products	62.6	89	[4]57	60.4	(NA)	(NA)
3481	Nails and spikes	2.7	89	[4]19	3.4	82	[4]18
3489	Wirework, n.e.c	59.9	89	[4]63	57.0	91	[4]60
349	Metal products, n.e.c	138.9	91	81	116.1	(NA)	(NA)
3491	Metal barrels, drums, and pails	10.6	82	86	10.9	83	83
3492	Safes and vaults	3.4	87	97	3.8	98	98
3493	Steel springs	7.1	84	74	7.8	89	68
3494	Bolts, nuts, washers, and rivets	53.7	91	89	49.2	92	86
3495	Screw-machine products	35.0	93	82	28.6	94	86
3496	Collapsible tubes	4.3	93	100	3.9	91	100
3497	Metal foil	6.7	92	80	4.3	97	76
3499	Fabricated metal products, n.e.c	18.1	85	53	7.6	90	60
35	Machinery, except electrical:						
351	Engines and turbines	82.0	88	84	87.7	(NA)	(NA)
3511	Steam engines and turbines	30.2	88	87	22.2	82	81
3519	Internal combustion engines	51.8	87	83	65.5	81	78
352	Tractors and farm machinery	139.1	87	92	171.5	(NA)	(NA)
3521	Tractors	64.7	85	93	77.3	83	95
3522	Farm machinery, except tractors	74.4	89	90	94.1	89	92
353	Construction and mining machinery	109.4	87	85	113.9	(NA)	(NA)
3531	Construction and mining machinery	75.7	86	81	84.7	85	82
3532	Oil-field machinery and tools	33.7	89	93	29.2	88	91
354	Metalworking machinery	262.7	92	87	220.9	(NA)	(NA)
3541	Machine tools	81.0	84	93	70.0	77	86
3542	Metalworking machinery	59.5	85	85	55.0	87	87
3544	Special dies and tools	122.3	89	73	95.9	90	80
3545	Metalworking machinery attachments						
355	Special-industry machinery, n.e.c	165.8	87	85	207.3	(NA)	(NA)
3551	Food-products machinery	33.2	84	86	36.9	89	82
3552	Textile machinery	36.6	89	93	53.6	95	93
3553	Woodworking machinery	12.0	84	81	16.2	78	77
3554	Paper-industries machinery	15.0	85	86	17.1	85	89
3555	Printing-trades machinery	22.0	95	90	24.9	95	94
3559	Special-industry machinery, n.e.c	47.0	81	73	58.6	80	78
356	General industrial machinery	223.9	85	81	219.0	(NA)	(NA)
3561	Pumps and compressors	60.3	82	78	56.1	81	85
3562	Elevators and escalators	10.3	87	89	10.2	92	91
3563	Conveyors	32.4	77	80	24.6	78	80
3564	Blowers and fans	18.1	83	76	14.8	75	78
3565	Industrial trucks and tractors	15.8	88	83	13.9	84	84
3566	Power-transmission equipment	49.6	88	86	54.0	87	84
3567	Industrial furnaces and ovens	8.4	84	84	6.4	86	74
3568	Mechanical stokers	1.1	74	60	4.1	71	74
3569	General industrial machinery, n.e.c	27.9	80	66	34.8	78	75
357	Office and store machines	101.3	80	96	97.8	(NA)	(NA)
3571	Computing and related machines	56.7	78	93	45.6	94	94
3572	Typewriters	18.4	80	97	26.6	[11]90	[11]97
3576	Scales and balances	5.4	90	96	6.5	91	92
3579	Office and store machines, n.e.c	20.8	79	90	19.1	89	90

See footnotes at end of table.

Code	Industry title	1954			1947		
		All employees[1] (1,000)	Industry ratios (percent)		All employees[1] (1,000)	Industry ratios (percent)	
			Specialization[2]	Coverage[3]		Specialization[2]	Coverage[3]
35	Machinery, except electrical--Continued						
358	Service and household machines	196.5	85	90	219.6	(NA)	(NA)
3581	Domestic laundry equipment	22.1	93	81	28.4	90	91
3582	Laundry and dry-cleaning machinery	6.5	83	93	9.1	94	94
3583	Sewing machines	12.4	91	94	15.3	95	94
3584	Vacuum cleaners	8.4	80	88	14.9	84	88
3585	Refrigeration machinery	128.3	(7)	(7)	128.7	(7)	(7)
3586	Measuring and dispensing pumps	8.4	69	91	12.1	76	98
3589	Service and household machines, n.e.c	10.4	85	76	11.1	83	82
359	Miscellaneous machinery parts	261.0	90	88	214.5	(NA)	(NA)
3591	Valves and fittings, except plumbing	75.0	85	86	79.7	82	90
3592	Fabricated pipe and fittings	12.7	92	88	10.6	82	83
3593	Ball and roller bearings	49.7	98	98	52.2	94	96
3594	Industrial patterns and molds	19.9	93	73	9.7	(NA)	(NA)
3599	Machine shops	103.7	88	86	62.4	92	77
36	Electrical machinery:						
361	Electrical industrial apparatus	340.0	88	91	315.5	(NA)	(NA)
3611	Wiring devices and supplies	43.2	85	86	39.2	85	86
3612	Carbon and graphite products	8.3	98	94	7.8	95	95
3613	Electrical measuring instruments	33.0	75	76	20.9	84	80
3614	Motors and generators	112.0	82	84	125.3	81	92
3615	Transformers	41.0	87	94	36.6	85	91
3616	Electrical control apparatus	79.3	89	91	67.5	86	87
3617	Electrical welding apparatus	8.2	90	92	7.3	93	89
3619	Electrical industrial apparatus, n.e.c	15.0	81	64	10.9	77	53
3621	Electrical appliances	48.6	76	74	44.1	86	72
3631	Insulated wire and cable	14.4	96	4 27	20.3	96	4 31
3641	Engine electrical equipment	46.3	85	87	44.5	89	91
3651	Electric lamps (bulbs)	22.0	94	99	23.8	94	100
366	Communication equipment	445.8	93	96	303.4	(NA)	(NA)
3661	Radios and related products	294.0	(7)	(7)	178.6	(7)	(7)
3662	Electronic tubes	71.0	97	94	27.7	94	95
3663	Phonograph records	6.2	94	97	10.0	96	99
3664	Telephone and telegraph equipment	64.7	93	96	76.1	94	99
3669	Communication equipment, n.e.c	10.1	87	77	11.0	86	83
369	Electrical products, n.e.c	42.0	95	83	44.8	(NA)	(NA)
3691	Storage batteries	15.7	100	100	16.6	11 90	11 99
3692	Primary batteries	10.8	98	98	10.3	11 90	11 98
3693	X-ray and therapeautic apparatus	7.1	81	91	7.7	94	93
3699	Electrical products, n.e.c	8.5	89	48	10.3	83	52
37	Transportation equipment:						
371	Motor vehicles and equipment	695.5	96	98	693.8	(NA)	(NA)
3713	Truck and bus bodies	18.7	86	87	26.6	79	90
3715	Truck trailers	16.4	82	93	12.5	81	87
3716	Automobile trailers	11.1	99	98	9.6	98	99
3717	Motor vehicles and parts	649.3	(7)	(7)	645.1	(7)	(7)
372	Aircraft and parts	822.5	96	95	219.6	(NA)	(NA)
3721	Aircraft	457.6	89	99	146.6	(NA)	(NA)
3722	Aircraft engines	167.4	93	91	50.4	90	95
3723	Aircraft propellers	16.5	84	87	7.4	(NA)	(NA)
3729	Aircraft equipment, n.e.c	180.9	86	66	15.1	82	38
373	Ships and boats	126.4	94	98	149.7	95	99
3731	Ship building and repairing	109.5	92	99	130.8	94	98
3732	Boat building and repairing	16.9	93	85	18.9	83	88
374	Railroad equipment	51.6	83	90	91.3	(NA)	(NA)
3741	Locomotives and parts	20.9	82	95	30.4	95	83
3742	Railroad and street cars	30.7	83	86	60.9	91	(NA)
3751	Motorcycles and bicycles	7.1	86	92	15.6	87	89
3799	Transportation equipment, n.e.c	1.6	92	44	4.6	82	67
38	Instruments and related products:						
3811	Scientific instruments	45.3	77	64	18.4	81	82
3821	Mechanical measuring instruments	69.4	87	79	60.5	84	81
3831	Optical instruments and lenses	12.7	82	77	8.5	93	75
384	Medical instruments and supplies	38.1	88	86	39.1	(NA)	(NA)
3841	Surgical and medical instruments	6.6	86	75	7.0	83	88
3842	Surgical appliances and supplies	24.5	85	85	23.1	81	91
3843	Dental equipment and supplies	7.1	95	94	9.1	97	94
3851	Ophthalmic goods	18.5	83	94	22.6	86	97
3861	Photographic equipment and supplies	59.1	90	95	55.6	93	97
387	Watches and clocks	29.5	82	90	40.2	(NA)	(NA)
3871	Watches and clocks	25.7	82	90	34.6	97	98
3872	Watchcases	3.8	86	85	5.6	87	94

See footnotes at end of table.

Code	Industry title	1954			1947		
		All employees[1] (1,000)	Industry ratios (percent)		All employees[1] (1,000)	Industry ratios (percent)	
			Specialization[2]	Coverage[3]		Specialization[2]	Coverage[3]
39	Miscellaneous manufactures:						
391	Jewelry and silverware	48.0	93	96	55.2	(NA)	(NA)
3911	Jewelry (precious metal)	23.5	93	96	25.6	92	95
3912	Jewelers' findings	5.4	92	91	6.1	92	93
3913	Lapidary work	1.8	97	91	1.7	98	98
3914	Silverware and plated ware	17.3	91	97	21.8	98	97
393	Musical instruments and parts	15.4	96	96	16.9	(NA)	(NA)
3931	Pianos	5.8	88	100	7.0	94	100
3932	Organs	1.8	98	74	1.3	85	70
3933	Piano and organ parts	3.0	95	88	3.2	95	82
3939	Musical instruments, n.e.c	4.9	88	95	5.4	93	90
394	Toys and sporting goods	88.6	93	91	75.5	(NA)	(NA)
3941	Games and toys, n.e.c	38.2	95	89	27.1	92	90
3942	Dolls	15.1	92	97	9.8	89	98
3943	Children's vehicles	6.3	76	90	8.8	81	79
3949	Sporting and athletic goods	28.9	90	86	29.8	94	90
395	Office supplies	28.2	91	91	31.4	(NA)	(NA)
3951	Pens and mechanical pencils	10.9	89	95	15.6	93	95
3952	Lead pencils and crayons	5.0	88	94	6.3	91	90
3953	Hand stamps and stencils	5.7	90	89	4.6	89	89
3954	Artists' materials	1.9	84	76	1.4	79	74
3955	Carbon paper and inked ribbons	4.7	93	83	3.7	[11]90	[11]90
396	Costume jewelry and notions	66.7	91	94	66.0	(NA)	(NA)
3961	Costume jewelry	27.7	95	95	25.4	90	91
3962	Artificial flowers	7.3	97	98	7.1	97	99
3963	Buttons	8.5	92	89	10.6	93	94
3964	Needles, pins, and fasteners	23.2	82	91	23.0	91	89
3971	Plastics products, n.e.c	92.0	90	84	58.4	91	89
398 399	Miscellaneous manufactures	357.2	(NA)	(NA)	160.0	(NA)	(NA)
3981	Brooms and brushes	16.8	91	92	18.6	94	97
3982	Cork products	2.1	81	69	2.5	88	75
3983	Matches	6.2	100	98	7.4	[5]100	100
3984	Candles	3.0	87	93	2.4	91	87
3985	Fireworks and pyrotechnics	2.6	89	89	3.3	97	96
3986	Jewelry and instruments cases	8.0	85	92	7.2	85	80
3987	Lamp shades	5.0	93	96	4.5	93	93
3988	Morticians' goods	16.7	97	97	22.4	90	97
3991	Beauty and barber-shop equipment	1.7	92	71	3.2	77	68
3992	Furs, dressed and dyed	[1]3.5	([8])	([8])	6.9	([8])	([8])
3993	Signs and advertising displays	33.6	93	92	28.5	95	88
3994	Hairwork	1.7	96	97	1.2	95	99
3995	Umbrellas, parasols, and canes	3.2	95	92	3.6	97	100
3996	Tobacco pipes	1.5	99	98	3.1	(D)	(D)
3997	Soda-fountain and bar equipment	1.4	83	74	2.7	83	76
3999	Miscellaneous products, n.e.c	20.8	84	88	22.7	89	92
19	Ordnance and accessories	229.2	(NA)	(NA)	(NA)	(NA)	(NA)
1951	Small arms	13.8	(NA)	(NA)	10.5	(NA)	(NA)
1961	Small arms ammunition	28.5	(NA)	(NA)	8.1	(NA)	(NA)

NA Not available.

D Withheld to avoid disclosing data for individual companies.

[1]The average total employment figure for 1954 is based on data reported for four months (March, May, August, and November), except for industries with significant seasonal variations. For such industries (indicated by footnote 1), the employment figure is based on the average of the mid-month total for each of the 12 months of the year. For 1947, the employment figure for all industries represents averages of reported employment for the 12 months of the year.

[2]The "specialization ratio" measures the extent to which plants classified in the industry "specialize" in making products regarded as primary to the industry. That is, value of shipments of primary products of plants classified in the industry is expressed as a ratio of the total shipments of all products made by these establishments.

[3]The "coverage ratio" measures the extent to which all shipments of primary products of an industry are made by plants classified in the industry, as distinguished from secondary producers elsewhere. That is, value of shipments of primary products made by plants classified in the industry is expressed as a ratio of the total shipments of these primary products by all producers, both in and out of the specified industry.

[4]The low coverage ratio reflects industry classifications which are based on manufacturing process rather than products. The coverage ratio would be much higher if compared to shipments by process defining the industry rather than to shipments by all manufacturing industries.

[5]Specialization ratio is based on percentage of value of primary products to total shipments, including primary and secondary products and miscellaneous receipts (contract and commission work on materials owned by others, scrap and salable refuse, repair, etc.).

[6]The value of shipments of the industry contains significant duplication of such shipments within the industry. The ratios shown are based on estimates of unduplicated totals and are generally minimum percentages.

[7]Relationships not computed because of significant duplication in shipments within the industry for which estimates are not available.

[8]Relationships not meaningful because of the predominance of miscellaneous receipts, particularly receipts for contract and commission work on materials owned by others.

[9]In 1947 a number of textile mills (Major Group 22) producing sheets and pillowcases reported such shipments as gray broad woven fabrics. This resulted in an understatement of the 1947 total value of housefurnishings and an overstatement of the coverage ratio for Industry 2392. In addition the change in reporting of fabricating departments of textile mills results in some noncomparability of the coverage ratios for 1954 and 1947.

[10]In 1954 data for edible and inedible stearin were reported separately and classified as primary, respectively, to Industry 2011 and Industry 2889. Since such distributions could not be made from the 1947 data, the 1947 coverage ratio, computed as 39 percent, is not directly comparable with 1954.

[11]These are minimum percentages. The exact percentage cannot be shown without disclosing figures for individual companies.